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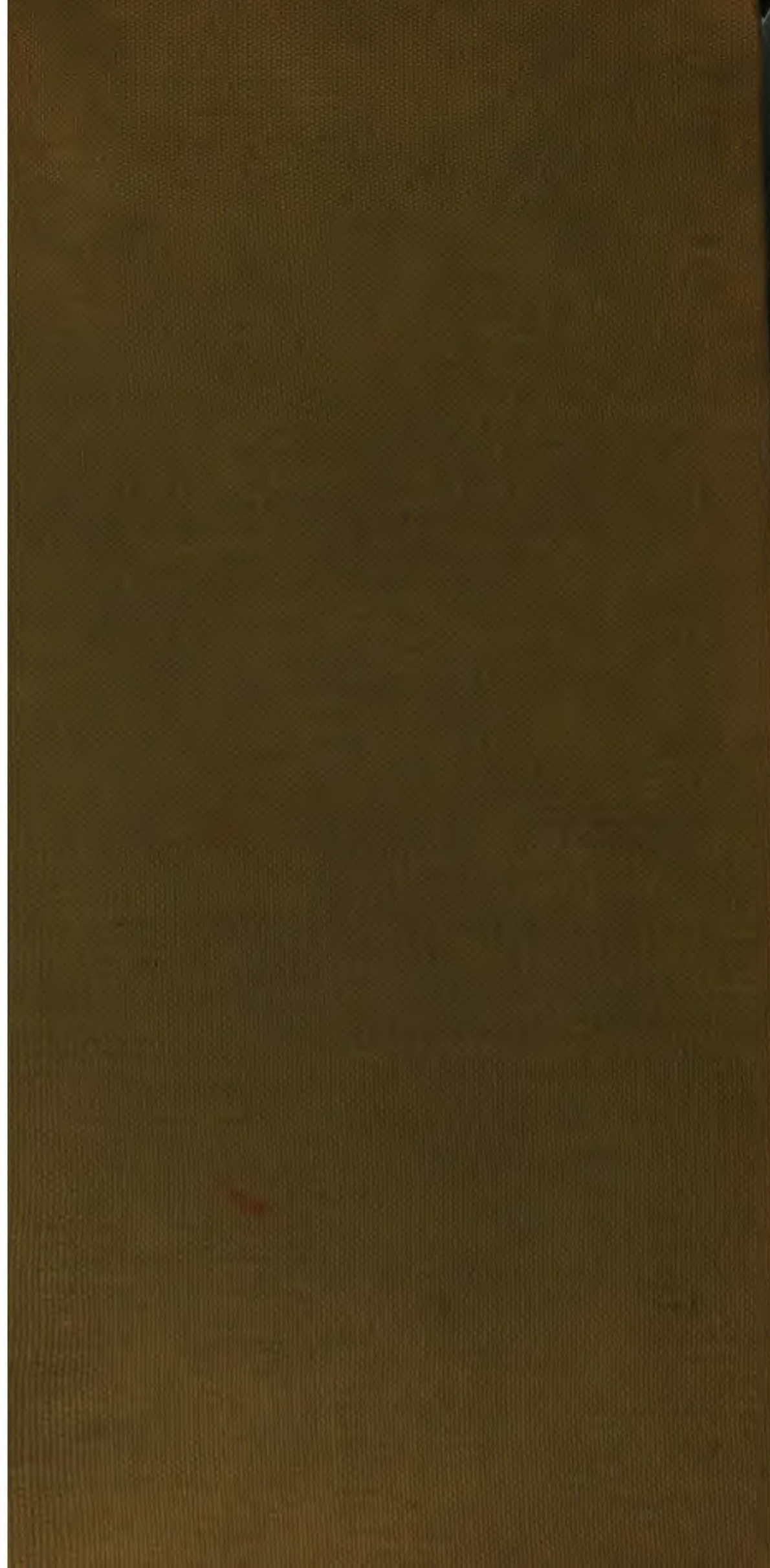
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1887.

(THIRD SESSION.)

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LEGISLATIVE ASSEMBLY.

NEW SOUTH WALES.

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# REPORT

ON

# TECHNICAL EDUCATION.

BY

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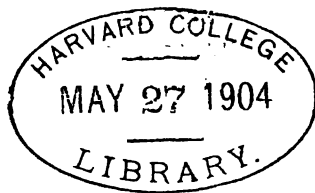
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## REPORT.

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EDWARD COMBES, C.M.G., to His Excellency The Right Honorable CHARLES ROBERT, BARON CARRINGTON, a Member of Her Majesty's Most Honorable Privy Council, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

MAY IT PLEASE YOUR EXCELLENCY,

In the prosecution of the inquiry into the present position of Technical Education in Europe and America, I have visited the most renowned educational establishments for this class of instruction throughout Great Britain and many European countries, making special research into the teaching of home industries, the existing facilities for imparting technical instruction, and the general character of the primary education given in these different countries with regard to its connection with the technical training necessary to afford facilities for children obtaining instruction of a character suited to the manufactures for which the various country districts are celebrated or distinguished.

I have also availed myself of every opportunity of securing information from reliable authorities upon these subjects, and have obtained the opinions of men of eminence in almost every country of Europe, as well as from public bodies, syndicates of *industriels*, and societies of working men.

I also had the opportunity of attending, as a delegate from New South Wales, the International Congress at Bordeaux, which had for its object the discussion of all subjects embraced by technical instruction, whether of a commercial or industrial character. This Congress afforded me the materials for efficiently comparing the various means adopted for teaching and for obtaining the opinions of the most experienced technical educators of all European countries. The report of this Congress has not yet been printed or I should have appended it in its entirety, so as to have obtained the full value of the views of the distinguished men who attended the Congress and who gave their opinions as to what form of elementary training in the public schools was the most advantageous for the development of national industries, without reference to the ultimate character of individual studies in any particular direction, whether artistic, scientific, or mechanical, but something common to all in the rudimentary stage of education.

It is not my intention to give a history of technical education generally, as this has been done in a most detailed and circumstantial manner in the various reports

reports of Commissions appointed by the English, French, and American Governments, as well as by distinguished technical educators, notably Tresca, Guillaume, Magnus, and Edward Clarke. In 1881 a Royal Commission was appointed by Her Britannic Majesty to inquire into technical instruction, which Commission, after a most exhaustive inquiry extended over Great Britain, the European Continent, and America, reported very fully in 1884, bringing all the information it was possible to obtain upon the subject down to the time of the inquiry in the most thorough and satisfactory manner. It therefore occurred to me, in carrying out my instructions, that as the report of the British Royal Commission was conclusive to the period above stated, it would be better for me to take up the subject where they left off, and use the time at my disposal in making inquiries as to the progress that has been made during the last three years. I shall introduce the evidence of this Commission for my purposes where required, supplementing it where I have later information, or where there have been changes and improvements, and detail as concisely as possible what they are, and wherein these improvements consist. Examples of schools, of a similar character, of different countries will be given in order to compare and form a correct opinion of their respective value.

I shall therefore divide the Report into two parts, the first of which will treat of industrial art schools, including everything which relates to the teaching of drawing and modelling. The second will be devoted to general technical education, including the various subjects of manual work in public apprenticeship schools, workshop instruction, and professional schools of that type which forms the workmen of any particular industry for which the special instruction is given.

The great question in technical matters at the present time, respecting which there are considerable differences of opinion, is with reference to apprenticeship schools. It is contended on the one hand, that as the old system of apprenticeship has completely broken down, it is incumbent upon the State or the Municipal Government to teach trades in schools instituted for that special purpose. On the other hand, it is stated that these schools are objectionable on account of the results not being commensurate with the expense. That they are not thoroughly effective, as in the multiplicity of trades, properly equipped technical schools for them all would be an impossibility, that as improved methods and machinery are constantly being discovered and invented, as educational establishments they would soon fall behind the factories, and moreover that it would always be felt that the work was not real, and from want of association with workman, the pupils would at best be only amateur artizans and unfitted to commence life as skilled workmen upon leaving the school. In dealing with this subject further on I shall enter fully into the reasons given by the contending parties. There is much to be said on both sides, for while there can be no doubt of the utility of apprenticeship schools for turning out scientific and highly skilled workmen, eminently fitted for foremen, managers, or proprietors of industrial works, the cost of training in these institutions is too great for the system to be applied to the masses. No doubt modifications of the system will be tried and found more economical, and as it is now generally conceded that manual training should be a part of general education, boys on leaving the public schools of primary instruction will have acquired such an account of manual skill as will do away with the drudgery to which they are subjected at present when commencing actual work in the factory or workshop.

But

But whatever may be the differences of opinion with reference to manual training, there is none as regards drawing. Eight years ago I advocated the principle that drawing should be taught in all the elementary schools. A child should commence drawing when learning his alphabet. To learn the name of the letter, and at the same time to imitate its shape from a model, is the way for a child to learn reading, writing, and drawing at one and the same time. The child does this far more easily than he possibly could if taught separately, for the one helps the other; the eye and hand are brought into unison from the first, and once this is firmly established everything else comes easy.

The importance of drawing in industrial education cannot be overrated. It is the foundation of all the constructive arts. No industries can wholly dispense with drawing, and its exercise instructs the eye and hand to travel together. It is an essential aid to every class of artisan, while it instructs and improves both mind and body in its imitation of nature. It is an universal language common to all people of every nation, always useful, and often indispensable, for while manual training in the use of tools may be left to the latter half-dozen years of the child's school age, drawing must be commenced from the earliest period, in order to make the eye and hand thoroughly understand each other.

I say that no difference of opinion exists as to the absolute necessity of teaching drawing from the very beginning, for it has been made a branch of primary education in every system of public instruction throughout Europe, and is now considered as necessary to a child's education as writing. It is no longer optional, but a required study. Its adoption is no longer an experiment, but an undoubted established fact. It must be honestly attended to by the teachers of public schools, who should take advantage of every opportunity to improve themselves in free-hand drawing. I am aware that many of our public school teachers have never had the opportunities that are now given in normal schools and training colleges to acquire that freedom of hand so necessary in a skilful artist. This drawback existed in France, Germany, and Belgium, although in a less degree, and exists at the present time in England, but the most strenuous efforts are being made by the teachers themselves to acquire the handskill and method requisite to enable them to carry out the instructions of the School Boards. Every year makes a marked difference. The teachers have become convinced of the necessity of teaching drawing from the earliest age, and, consequently, they energetically endeavour to qualify themselves to impart the requisite instruction. Throughout the world at the present moment a great movement is going forward, demanding such a school training as will give better results in a proper preparation for the work of life than has hitherto existed. We must make use at once of the materials we have at hand. We have good public schools, in which drawing must be taught. There is nothing to hinder this from being done honestly, not in a half-and-half manner, but with that enthusiastic welcome the matter has been received in Europe. It must never be forgotten that drawing renders pupils more apt and better able to receive any subsequent industrial training, no matter in what branch of applied art, or whatever may be the industrial occupation, and the shorter time required to reach the position of a skilled workman is equivalent to a direct money gain by the State, fully sufficient to compensate the cost of the education.

Froebel,



Froebel, whose system is entirely based upon the relations between the eye and hand, gives, in his work on the education of man, the nature of a child's early investigations. Anyone who has attentively considered the natural inquisitiveness of children will recognize at once the accuracy of his remarks. He says:—"A child finds a bit of stone, and to conclude on its properties by its effects, he rubs it on a bit of board near him, or on the floor, thereby discovering the properties of colouring. It is a bit of lime or clay, red or white chalk. See how he delights in the newly discovered property, and how he makes use of it with busy hand and eager arm. In a short time the board is covered. At first the unknown property, then the altered surface, delights the child, now red, now white, now black, now brown; but soon he finds pleasure in the winding, straight, curved, or other forms. By these linear appearances the child's attention is drawn to the linear property of surrounding objects. Now the head becomes a round, and the rounding line returning to its beginning point becomes a head; the oval line connected with it a back; arms or legs appear as straight or crooked lines, and such lines become to the child arms and legs; he looks upon fingers as lines coming together to a point, and lines thus connected become to him hands and fingers; eyes appear to him as points, and points become eyes; and a new world grows up within and around him, for what man tries to represent he tries to understand."

"The rolling sphere, the thrown and falling stone, the water in the gutter dammed up and divided into little diverging ditches, have taught the child that the direction of the effect of power is always linear—the representation of objects by lines leads the child soon to the perception and representation of the direction in which the power works. "There flows a brook," and saying this the child makes a mark to indicate the course of the brook. The child has connected lines which represent a tree to him—"a branch grows out there and another here," and at the instant of speaking he draws the lines off from the tree to represent the branches. Very descriptively the child says: "There comes a birdie flying," and immediately draws a winding line in the direction of the imaginary flight.

"Give the child chalk or anything similar and soon a new creation will stand before him and you. The father makes for him a man or a horse with a few lines; this line man, this line horse, gives the child more pleasure than is given to him by the actual form or by the man himself. But the child soon makes an advance, he attempts to draw table, chair, and window. See how it developed itself for this and trained itself to it? Objects which he can move he places on the board, the bench, or table, and draws their form on the plane surface. Soon scissors and boxes and leaves and twigs, even his own hand, or the shadows of objects, will be thus copied.

"The fostering mother, the tender father, the needful family (without a natural artist among them and often without ever having drawn themselves), can carry the child on far enough for him to be able to draw a straight line, a cross line with tolerable accuracy, even to draw a rectangular object in a vertical position (for example a looking-glass or window) with some resemblance to the original; and also many other things. But it is not only good but even necessary in order to develop and increase the power and capacity of the child, that the father and mother should, without being over-anxious or careless, always connect the action of the child with words

words : for example, I am drawing a table, a looking-glass, the cross lines of the backgammon board. To the child this mode of procedure heightens the inner and outer power, extends the knowledge, awakens the power of judgment, and the thoughtfulness which protects from so much incorrectness, all which qualities cannot too soon come to man in his intercourse with nature. For word and sign are reciprocally explaining and completing, since neither of them is individually exhaustive and sufficing in respect to the object represented. The sign actually stands between the word and the thing, has properties in common with each, and is for that reason so very important as a means of training and development for the child. The genuine sign has this in common with the thing, that it strives to represent the form and outlines of the thing ; it has this in common with the word, that it is never the thing itself, but only an image of it. Again, word and sign are of a purely opposite nature ; for the sign is dead while the word is living ; the sign is visible while the word is audible. Therefore word and sign belong inseparably together, as do light and shade, day and night, spirit and body. Therefore the capacity for signs is as innate in the child as the capacity for speech, and as absolutely requires development and cultivation ; as is shown in experience of the child's pleasure in and ardent desire for signs.

“ Art as a representation by mere tone is music, and predominantly song. Art as a visible representation by mere colours is painting. Art as a representation in space by the formation of the mass is modelling.

“ Drawing, which, however, with equal reason, can be considered as the mere representation by lines, may be considered as the uniting middle point of the two latter ; in which case the drawing then appears to belong predominantly to representation by surfaces, and modelling predominantly to representation by material in space. On account of the just-mentioned connecting property of drawing the effort to draw is so early a phenomenon in the development of man, as we have already seen at the age of childhood.

“ Song, drawing, painting, and modelling must therefore necessarily be considered as a part of the general comprehensive education and training of man. They must be early treated as actual objects of the earnest school, and not be exposed to an accidental, worthless, and fruitless wanton arbitrariness ; neither with the view that each scholar becomes an artist in some kind of art, and far less with the view that each scholar be an artist in all branches of art, both of which nullify themselves (though one might say the former of each human being in a certain respect), but with the definite view that each man may be raised to the point of developing his nature faithfully, completely, and on all sides ; that he can raise himself to the point of recognizing the all-sided and all-powerful nature of man ; but especially, as has been already stated, that each man understands how to perceive and to value the results of genuine art.”

This is generally what Froebel himself has laid down. The life and impulses of the boy have actually but one aim, that of outwardly representing his personality ; indeed his life actually consists only in an outward representation of his inner nature, his power, especially with material and by means of material. The direct and logical relation of the Kindergarten system to that training of the hand and eye which we seek to develop in industrial art education

is

is firmly insisted upon by all followers of the Froebel system. It is to be regretted that in English and Colonial schools the system has not been harmonized by the tuition given in the infant classes of our primary schools. It is exceedingly difficult to alter the routine of the public school system, but great advances have lately been made with a view to bring the Kindergarten system, which is doing such good work on the Continent, into direct harmony with the lower class of the primary school. For myself, I see little difficulty in doing this, as object lessons are common to both forms of schools. The Kindergarten games, which are intended, and serve, to cultivate the sympathy of the child, through the representation of the life around him, has no equivalent in our infant classes, but were they substituted for the stiff and rigid *régime* now in force they would form a better foundation for the reading, writing, drawing, and arithmetic which is taught in the primary school; instruction in the latter being given through the elementary stage, with objects to aid in securing attention and to lead to the correct application of the principles of thought as developed through the treatment of numbers. What, therefore, now appear to be distinct and disconnected systems would no longer be so, but would be recognized as constituting only different degrees of progress in the same system of education. There is no difference of opinion now with reference to the value of object lessons. Their value is acknowledged by all progressive educators.

Mr. McArthur says that in Massachusetts, New York, and many other places in America, lessons in drawing are brought within the reach of every child in the community, and evening classes are also opened in some of the large towns for the instruction of all who may come. In Washington drawing is taught in the public schools—not as a speciality, but in the regular course of study. Drawings by the pupils have been exhibited two years at an annual exhibition for public inspection; and the fact that such exhibitions are visited by thousands of the citizens not only displays how general is the interest, but inspires the hope that this art, with its refining and commanding influence, is gradually assuming its true position in the ordinary course of common school education. It is absolutely necessary that all the business and industrial classes should understand this practical art in the utilitarian struggle of this age and country. All the callings and pursuits that are brought into competition with each other stand ready to appropriate every revelation of art or science that can promote their interest. Science is no longer speculative, and art is no longer confined to mere artistic effect. They are applied to all the industries of society, and the competition is so keen that he who knows best how to apply them to the processes of production is sure of success. The inventor, the artificer, the workman, and the manufacturer are all interested in a study that so deeply concerns their several pursuits. Architecture, bridge-making, every species of machinery and internal improvement, every instrument associated with our labour or convenience, our china and earthen ware, the fabrics which are so delicate in texture, so brilliant and harmonious in colour, and so striking in general elegance of style, as well as the articles in the parlour, the kitchen, the pantry, and, indeed, all the improvements in modern life, serve to illustrate the principles of design, and are manufactured and fashioned from geometrical patterns and outline representations which were prepared in the first instance by the draftsman; and, unless these objects had been systematically drawn before they were made, they would never have existed, except in clumsy forms, and perhaps so badly that many of them would have been dangerous to the public.

“The

"The art of drawing is used in many cases where its employment is little suspected; look at a lady in full dress, and consider by what rules her bonnet was plaited, her laces were woven, her stockings were knitted, her comb was ornamented, her ribbons were flowered, her buttons were moulded, her necklaces and bracelets were fashioned, her shoes and even the rosettes on her instep were executed, and the answer will be that they were all devised by designs in drawing, and not a single feature of the lovely assemblage was left to chance or accident. The building of the poor man's cottage is according to plans and specifications; its boards, beams, roof, and floors are sawn, tongued, and matched to fit each other according to the drawings, and so are also the doors and windows of the humble dwelling. The manufacturers of the simplest instrument, like the hoe, the spade, the rake, the pick-axe, the scythe, the sickle, the reaper, chairs, and bedsteads, all have drawing-offices connected with their establishments. The machinist who makes the shears with which the shearers clip the flocks, and the machinery which cards, spins, and weaves the fleece into cloth, is dependent upon his practical designs. The mason cuts the stone upon which he bestows such prodigious labour by the same rules; nearly everything depends upon drawing. Drawing is as necessary as writing, and should, without the fraction of a doubt, be as universally taught. Hurnisch says, 'The cultivation of the faculties of representation and form gives us a feeling for beauty, grace, form, and symmetry.'"

Drawing, says Disterweg, as a result of artistic labour, has either a purpose outside of the art, such as mechanical, architectural, anatomical drawings and plans, or it is executed for its own sake, such as drawings from the figure, landscapes, fruit and flower pieces, &c. In the former case their purpose is principally one of material usefulness; in the second they are executed with an endeavour after a beautiful external form, and are thus a representation of the ideal as well as the real. Those of the first sort, however, do not exclude the beautiful, for every object, without any exception, can be represented with a due regard to the aesthetic.

Among the varieties of drawing are:—(1) Linear drawing, which gives only an outline of the object, and shaded drawing, in which the surfaces are shaded. (2) Geometrical and perspective drawing. The first represents objects in their correct relative proportions as to magnitude; the second as they appear to the eye. The geometrical delineation of one side of a body is called an elevation, and that of its horizontal surface a plan or ground plan. (3) Freehand drawing and sketching, either with or without the use of rule or compasses. (4) Copying or drawing from another drawing; drawing from nature or of real objects; imaginative drawing, or drawing of things conceived in one's own mind, of which the two former are of things as they are directly seen, and the latter are indirectly based upon the vision of real things.

Drawing is not only a suitable occupation for the young, but sharpens the vision, trains the hand for writing and other delicate employments, gives practice in observation and quickness of apprehension, affords a store of instruction and ideas, develops the faculty of order and the sense of beauty, gives activity and cheerfulness, and is absolutely indispensable in most occupations. In all drawing the eye, the hand, and the sense of beauty are employed; as are also in drawing from memory the faculty of conception, and in drawing from imagination that faculty is also developed.

The

are indelibly imprinted on the brain of those men, who have conscientiously and honestly laboured to obtain this information, and having begun in the right way they will in all probability become distinguished in their profession, having thoroughly acquired not only the principles but the true knowledge and application of art.

Among the ancients education was chiefly imparted by means of art. The body was brought into subjection and discipline by athletic exercises, while the mind was formed by exercises which were united under the common appellation of music, comprising not only what we understand as music but poetry. They attributed to music a singular power to modify the sentiments, and to fashion the soul. These were the great aims assigned to education.

With the moderns this art still plays a most important *rôle* in superior education, because it may be said that the principal object of the classical education of our Public Schools and Universities is to instruct their students in a knowledge of the beauties of ancient poetry and eloquence, and to form the taste by thus familiarizing the student with ancient art.

In the education of the masses this is not the case. In the programme of primary instruction there is truly a little singing taught, and also drawing after a manner, but nothing or next to nothing is taught as to what is truly beautiful, or as to the discrimination between beauty and ugliness. This however is really necessary in order to induce a taste for the beautiful. Popular education is constituted perhaps too much from a point of view of material utility, which is not altogether understood. The working classes, it has always been considered, should be only instructed to perform those necessary works to which their lives are to be devoted in a manner to give the greatest result to their efforts. In other words, to perform constant repetitions by a minute subdivision of labour, thereby making it possible to produce a larger quantity of work in a given time. That this work is neither influenced by art or taste can of course be easily shown.

In the first place, however, life with the working classes is really not so altogether devoted to these professional necessities as that there should be no room for thoughts and works of a higher order. In the natural development of the mental faculties the growth of the reasoning faculties has been invariably found to be much slower than those of the imagination. This law has been demonstrated to apply in the history of nations—in the infant as compared with the adult—with men of little education as compared with those more advanced and of a higher culture. It is upon this law that the reform of popular education has been based, a reform which consists in proposing sensible things and objects for instruction, before confusing them with ideas.

If, therefore, it be true that, as with children so with the people themselves, imagination precedes reasoning, then the imagination should be cultured in primary education in such a way as to occupy a prominent place. We know that nothing is more attractive to the imagination than the beautiful. And the sense of the beautiful, which is called *taste*, should be accorded a first place in every system of instruction, more especially in primary instruction in the teaching of poetry and art; for if education in the first place proceeds by realities and images we should serve ourselves with them, and make them the vehicles of teaching the sublime and beautiful.

By

By these means the grand problems of pedagogic systems have been and will be further resolved. Rousseau, Pestalozzi, Froebel, and others, have all worked on this plan, but they have used the best forms of objects. This is the direction in which our inquiry should be directed in the future. If the great secret of education is to do that, it depends upon teaching those things in which children are interested and which they love; then the secret of education is to present these things to the pupil under the most beautiful aspect and attractions. Philosophy in the nineteenth century says that beauty is another word for the universe; one might say, says M. Ravaisson, that beauty is another word for education.

In many of the primary schools linear drawing, by means of instruments of precision and according to the rules of geometry, takes the place of freehand drawing. This drawing which can be geometrically traced and measured, and done by the aid of instruments, gives little real education to the eye, and is not anything like so useful in the uses to which the various handicrafts apply drawing. It is the eye, says Leonardo da Vinci, that discovers everything. Therefore in all arts to see correctly, exactly, and quickly, is of all things that which is the most incomparably useful. To teach the art of seeing quickly and correctly is not done by constructing figures piece by piece according to set rules, without any intervention of judging by the eye alone, but in that exercise which consists in learning to estimate and appreciate all forms by the eye, to bring forms into characteristic harmony with their proportions, and to reproduce what the eye sees and comprehends in a sketch adequately and completely. The consideration then should be to select those forms which are most suitable for properly educating the eye, and for rendering its judgment sure. They are those, according to the greatest masters, which offer the most harmonious proportions, and these are certainly to be found in the highest form of nature, viz., the human figure.

Thus what is the most proper to educate the eye is certainly the exercise best adapted to students of all mechanical arts, the best preparation for all industries from the highest to the lowest. It also leads to the study of that art which cultivates good taste and makes it perfect. Students must therefore study the human figure after models which represent it in all the perfection of which it is susceptible, and with all the charms with which sentiment can endow it. For such teaching in popular schools masters may and probably would be wanting. They can be found, however, for the normal schools or training colleges, and the teachers that graduate from these institutions after a system has been initiated would institute such lessons as would soon bring about a better class of things—they would sow the seed they had received at their training college, and eventually there would be plenty of good masters. One cannot go wrong in the imitation of beautiful forms. To attempt to imitate is to learn something, and while these forms (which should be distributed to all schools) would induce an influence useful to all, there would be among the pupils those which would receive a living inspiration that would eventually enable them to become true artists.

Nothing gives the same amount of true happiness as art. Why, therefore, should not the masses be taught to obtain the salutary influence which it gives to those who have cultured tastes and a love for the beautiful, and who can appreciate to the utmost, by sight and hearing, correct proportions and divine harmonies?

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The man who has during a certain number of hours of the day to labour to gain his livelihood would surely find the greatest consolation and solace in being able to see and understand the beauties of nature, and endeavour, by his own hand, to reproduce what he sees in clay, or in colours, or simply in black and white by his pencil. Impressions which we obtain by our sense of sight imprint themselves upon the brain, and where preconceived ideas are wrong they are instantaneously changed for our benefit by the correct judgment of the eye.

It is therefore universally admitted that drawing should occupy an important place in primary instruction, and that when taught, as it should be, it not only gives the facility to many, in a greater or less degree, to represent the various forms which occur in almost all trades and professions, besides being of inestimable value in all sorts of ways in ordinary life, but it gives to all, in a marked manner, a correctness of eye and taste of universal utility. It remains to be seen in what the art of drawing consists, its principles cultivated and practised by the great masters, and the best and most convenient methods to follow in order to teach it. The arts that we have to study may be called figurative in opposition to that of music; or those which have for their object the representation of perceptible forms or forms that can be seen and touched. These divide themselves into two classes—sculpture and painting. The one consists in the production of forms which develop in every dimension, forming a complete figure in every sense. The other, by means of light and shade, makes its representations on a superficial plane by projecting upon a plan different rays of light conveying towards a common point. This projection or perspective acts in two ways, viz., by lines, &c., from the atmosphere called linear and aerial perspective, lessening and obscuring in direct relation to the distance from the eye, altering the forms but preserving an invariable law, in the observation of which painting is made to represent forms exactly as the eye sees them. Painting, when colour is not used, reduces the representation of forms by the difference of light and shade, called *claro-scuro* by the masters, this is the drawing; therefore, when, as stated above, colours are not used, painting is simply drawing. Painting is a universal language, serving to give expression to visible forms and things, and drawing is in effect the key to all the arts.

In architecture, as in sculpture and painting, drawing is at once the instrument and the language. To know how to draw, said Michael Angelo, is to have the compass in the eye. The geometrician wants the compass in the hand, but the designer and painter want it in the eye. In the first place mental calculation is required, while in the second there is an immediate intuition in a single glance.

Invention is distinguished in art as the work of the imagination, and is doubtless the creations of genius aided by imitation. This distinction is only relative. Imitation is not art if it does not participate in inventive originality. Imitation, pure and simple, is servile, not art, but purely mechanical industry. Art depends upon the creative will, and springs in harmony with those expressions which characterize beauty.

Beauty is therefore the profound source of all character in art; and this is remarkable in the productions of Nature, where everything is in perfect accord and unity.

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This principle, however, which, more or less powerful or feeble, is applicable to all art, becomes really the object of imitation. True science searches not only that which exists but that which, in the opinion of the student, should exist. Not so much the things themselves as the reason of things. It is different with art. To imitate Nature as she should be imitated it is necessary to be a master, otherwise it is impossible to render Nature in all its beauty. In consequence it is by imitation only that makes it possible to climb the steps of invention. It is necessary to learn how to imitate in order to arrive at that position when, by a thorough knowledge of the principles of all forms from which invention proceeds, the methods which are most proper and best adapted to the student's capacity; and, as a rule, these should not be based upon servile imitation of copying line by line, detail by detail, as such work conducts to nothing in an artistic way, but in copying those glorious examples of art which have been brought down to us from those ages, not servilely but with a free hand, and this seems in direct accord with the advice given by all the great masters. Study, then, closely and attentively those immortal examples, wherein are found united the most perfect form with the sublimity of the most divine beauty. Leonardo says:—"If you wish to learn to draw, imitate the work of great masters in order to accustom yourself to correct expressions of form."

There have been several methods employed to copy drawings in a way little calculated to benefit the student, one of which, by means of a frame upon which is stretched threads making a number of squares, which squares are also represented by pencil lines upon the paper upon which the copy is to be made. Upon looking through the squares formed by the threads, the points which cut the intersection of the threads are marked off on the paper, and then, having these points fixed, to fill in by the eye. It is, however, evident that this plan is almost as bad as in making a tracing of the outlines. All the details are made without reference to the whole, and renders the student incapable of correctly judging by the eye alone. This proceeding should be always from the whole to the details, which is the only true means of becoming an artist.

These plans of copying, however, are fast going out, excepting where copies have to be made, either of the same size or on a reduced scale, for the purposes of engraving, which is altogether a different affair to learning to draw. Under the influence of pedagogic theories there are, however, processes comprised under the denomination of geometrical methods, which really come almost to the same end as tracing by means of squares. It consists in commencing the drawing by simple geometric figures considered and constituted as the elements of the natural figures.

These processes can in fact be reduced to two; one consists in tracing geometric figures after rules furnished by geometry called linear drawing; the other consists in tracing the geometric figures, not according to rules, but by the judgment of the eye alone. Of these two processes the first conducts one to exact results, but in a circumscribed sense; the other, depending upon the eye alone, guides the hand from one part to the other with ever increasing skill, so soon as the eye and hand understand each other.

Geometric drawing is inevitably of the slow and heavy sort, even in its own especial domain, with figures simple and regular, one often requires the same as with other drawings, indications summary and rapid, such as can be only furnished without trouble by an experienced hand and an exercised eye. Geometrical drawing, even where it is in its proper place, does not always suffice. In short, it is not sufficient in itself. The instrument used is not placed where it ought to be, at  
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the exact spot it ought to occupy, and may lead to erroneous results. It is even necessary that an exercised eye controls the usage of these means of precision, it is necessary to judge by estimating what is likely and what is unlikely.

From this it may be seen that geometrical drawing, properly so called, should not be placed before the study of freehand drawing, which is so often the case, but that it ought, on the contrary, to be studied after the student has acquired a certain amount of facility in free-hand drawing, at least sufficient to enable him to judge with a practised eye, so as to employ geometrical drawing as an auxiliary method, to enable him to execute certain work where it is possible and necessary, or at least where useful for mathematical exactness. These principles have been considered by the Superior Council of Public Instruction, and also by a Commission appointed specially to make an official programme for the teaching of drawing; and geometrical drawing has been abandoned as the base of general instruction in the art of drawing.

It may, however, be asked that if the study of drawing is not to be commenced by geometrical instruction, and by the means of instruments, whether it ought not to commence by imitating, or drawing at once from the round. In a system erected upon such a foundation as this, after drawing from geometrical figures they may be succeeded by ornamental figures of simple combinations, afterwards by others borrowed from the vegetable kingdom, not far, however, away from geometrical regularity, and by little and little arriving at the human form. Thus the three degrees of teaching would be maintained, ordinarily called linear drawing, ornamental drawing, and figure drawing. These denominations have faults which bring about a confusion of ideas in order to explain them. Why give the name of *linear drawing*? What is the meaning of drawing by lines, in only tracing the outlines of geometrical figures? Cannot the features of a living being be represented as well as a simple geometrical figure? In designing ornaments, if the vegetable kingdom is to be admitted, why exclude the animal kingdom? The antique ornaments of the *renaissance* which we so much admire, are full of representations of animals and even of man, as well as by the lovely combinations of plants.

Consider the immense variety of forms which living beings offer to the artist, especially the sinuous figures and surfaces, which distinguish the human figure, and then determine whether such lines cannot be made use of in the highest class of decorative art. It is, however, well for students to see and examine for themselves what has already been done by the great masters, and where schools are situated far away from museums and art galleries, where these everlasting treasures can be seen, one of the first things to do for all schools of whatever grade, is to obtain a certain number of reproductions in plaster casts or photography of the most celebrated masterpieces. These are calculated to awaken in the minds of the students that idea of perfect beauty so well understood by the ancient Greeks and the great masters of the *renaissance*. The Greek youth got their first lessons in art from their temples where their lessons seemed to emanate from the divinity—and the fragments of those lessons which we find at the Vatican, the Louvre, and the British Museum, still serve the purpose for which they were intended, admired and appreciated by the entire world.

We speak of different systems of art-education as the English or South Kensington, French, or German methods, whereas in none of these countries is there any hard and fast or even a comprehensive system of giving instruction in art for the public schools. There is as a matter of fact no absolutely national system of art education.

education. When any of these so-called systems are taught they are found to be the curriculum of some special schools carried on it may be under the auspices of the Government, but really having no absolute pretensions to be graded and comprehensive in the way that general education is graded, proceeding from the infant school to the University. In speaking therefore of the different methods, I must be understood if I use the word system to mean the particular method made use of in the institution under description at the present time, or rather during the time of my visit. I shall describe the various plans adopted, and afterwards state my opinions and make my recommendations. It is not only to those who intend to make architecture, sculpture, or painting a profession that drawing is necessary, it should be employed by all. The artizan must be able to draw for the purposes of his trade, and the upper classes for recreation.

It is impossible to make a scientific analysis of Fine Art. Goethe says: "Analysis can divide a thing into its elements, but while we are holding these separate elements in our grasp, we have unconsciously lost the spirit band, which really made the thing what it was."

Principles are few, but art is infinitely varied. Masses of men fill the different occupations in our large manufactories, embracing founders, smiths, machinists, carpenters, patternmakers, upholsterers, painters, fitters, mechanical engineers, designers, and superintendents, all artists, differing but in their class of work; and whoever has been trained in technical hand-work possesses the key which will unlock the door to all these vocations. Natural faculties are as greatly varied in individuals as the forms of art themselves, and this variety of talent extends throughout the domain of art. Albert Durer was both painter and designer, and renewed the arts of engraving and wood carving. He was an excellent etcher, and produced beautiful work with the dry point. Look at the mighty in art of the *renaissance*! Look at Leonardo da Vinci, that glorious painter, architect, and engineer! Michael Angelo, painter, sculptor, architect, engineer, in short, who was inspired with art, and could do everything well. There are hundreds of others to whom we might refer ourselves for the truth of what we assert. Nothing is derogatory to great men who like Michael Angelo could and did design a piece of furniture, a sword-hilt, construct a St. Peter's Church, paint the "Last Judgment," or chisel a "Moses" or "David" from the marble. Drawing is therefore the golden key, and must be taught, as recommended by the English Commissioners. After they had seen the wonders it had worked on the Continent, they recommend "That rudimentary drawing be incorporated with writing as a single elementary subject, and that instruction in elementary drawing be continued throughout the standards; that the inspectors of the Education Department be responsible for the instruction in drawing, and that drawing from casts and models be required as part of the work, and that modelling be encouraged by grant." I had felt this long before, and it was most pleasing to me that the Commissioners made it the first of their recommendations.

Excellent work has been done in England, and the manufacturing districts educate their own artists, and are not as formerly dependant on foreign aid for designs worthy of production. Mr. Sparkes, writing in 1884, in combating detractors, says:—"To those who would disparage the work of the schools, the fact that French monopoly of designing is at an end, so far as English manufacture is concerned, should be in itself a sufficient answer, irrespective of other considerations.

Instead

Instead of going abroad for designs, foreigners becoming familiarized with our advance in the industrial arts, are now continually coming to examine our system of teaching, to study our methods, and to avail themselves of the examples placed before our pupils at South Kensington and elsewhere, to the value of which they are indeed as much alive as our home manufacturers. As an illustration of the altered relations between England and France, it may be stated that about five years ago one of the first manufacturers in Paris sent over to England for a collection of English designs in paper-hangings, in order that his designers might avail themselves of them. Indeed, at a much earlier period than this, a number of designs for silk damasks, cretonnes, and paper-hangings, were purchased by a French firm from students in the training school of South Kensington, and were successfully produced in France. For evidence of our advance in artistic culture, it is but necessary to consult those who are old enough to remember the changes of the last thirty years, and to hear what they say of the improved appearance of our shops and shop-fittings, our warehouses and wares, our furniture and table appointments, our wall-papers and carpets, our books and book-bindings, our illustrated periodicals, our children's toys and picture-books, into which Richard Caldecott, Walter Crane, and Kate Greenaway, have introduced artistic treatment of quite an original character, delighting young and old, alike. There is scarcely a household in the country that is not the better for the change, not a manufacture in which design has a place, that has not felt its influences; and it would be altogether idle to deny that this advance, to be seen on every side, is greatly attributable to the Schools of Arts."

With respect to the influence of the department on elementary drawing, statistics show that between 700,000 and 800,000 children are receiving such instructions in elementary day schools, in addition to those who are commencing their artistic education in Schools of Arts; but the elementary teaching is not what it ought to be and might be, for it proceeds too much on the lines of free-hand and model drawing, and practical geometry, whilst insufficient attention is given to mechanical drawing, and moreover black-board teaching is greatly neglected. "About thirty years ago," Mr. Sparkes says, "more attention was given to this matter, at a time when a master in training had three or four national schools to attend to, the work being done under the supervision of the head master, who was very efficiently assisted in the work of inspection by Mr. Swinstead, one of the masters; and it was sought to interest both masters in art schools and those in elementary schools by a money grant, which they shared between them. Gradually the elementary master became entitled to his drawing certificate on passing an examination in four second grade subjects, with a fifth for black-board drawing or writing; and as his teaching power was subjected to no test, classes soon fell into a feeble condition. The system of examination at South Kensington doubtless failed to prevent this, and hence our backward condition as compared with foreign countries; but it may be doubted if a remedy for the present weakness in our elementary teaching is to be found in a suggestion made in the report of the Technical Commission, namely, "that the instruction in drawing in elementary schools should be carefully supervised on the spot by the Whitehall Inspectors as is that in other branches of primary education," unless indeed a distinct staff of Inspectors should be appointed for the purpose of possessing trained artistic ability. The more advanced elementary drawing of the second grade is usually very well done, though even here, as in the earlier stage, a system of coaching up from copies for the examination on which payment is made, is not unlikely to prevail when the master's income is in any degree dependant on its results. The exclusion of large work

work done from blackboard examples in a given time, is much to be regretted, as the plan of working down to examination copy standard for a monetary result is inadequate to develop the power most useful to children about to engage in various handicrafts." He goes on to say, "If we regard the schools of art under their original designation as essentially schools of design, it cannot be doubted that they have had a most useful past; and, in anticipation of a still more useful future, attention may be drawn to the large proportion of schools to be found in towns where design is of the first importance to the success of the local manufacturers. Moreover, as the employment of ex-students as designers has been sought at the various schools, and although in several cases they were stated to be so numerous that a list of names could not be attempted, and in almost all the record was dependent on the imperfect recollection of the master, extending sometimes over a very limited period; lists of names have been received showing that many hundreds of men and women, trained in the schools, are at this moment engaged in the work of designing, not only in England, but also in France, Russia, Spain, America, Australia, New Zealand, India, the Cape of Good Hope, &c., &c., and at home they have in many places superseded foreign designers. At Sheffield, for example, a dozen French designers and artists, chasers, were, in 1852, the chief authorities on design and taste, and their work was mostly of a depraved Louis Quatorze character. The manufacturers being indifferent to art, the designers were absolute in their control, and the public, beguiled by richness of treatment, made no objection to the style then in vogue. Ten years later these French modellers and designers had been supplanted by Englishmen, and this change was greatly due to the influence of the late Alfred Stephens. Having gone as a boy to Italy, Stephens spent thirty years there, and on his return to England obtained employment as one of the masters at Somerset House. On the reorganization of the school he found it necessary to seek employment, and a Sheffield manufacturer had the wisdom to secure him as his chief artist, on the recommendation of Mr. Young Mitchell, the head-master of the local school of design. Mitchell and Stephens became fast friends, and the latter thus exercised an indirect influence over the school, for the accommodation of which a new building was erected at great cost. The school committee was originally composed of dilettanti, the manufacturers being conspicuous by their absence, but now the latter take their full share in the government of the school. There is not a single French designer in the town, only two French chasers, and the leading manufacturers, especially those who produce the most artistic works, and general public are greatly interested in the school, many past students of which are occupying honorable positions elsewhere. In Nottingham, twenty years ago, the lace designs, most of which were produced by foreigners, were, as a rule, lamentably deficient in artistic taste, although there were some good ones amongst them. Sprawling palm-trees, nondescript flowers, and absurd ornaments were huddled together in ugly confusion, and any attempt to leave the beaten track was regarded with disfavour, except by the Science and Art Department, which afforded great encouragement by its favourable recognition of good work. A school of design was established in Nottingham in 1843, but little attention was given to the staple manufacture till 1866, when the school secured the services of a master who established special classes for the study and practice of design. After a time he conceived the idea of basing his pupils' work on good specimens of old hand-made lace, English and foreign, which were modified to suit the capabilities of the machine, and this in its turn was improved so as to be capable of producing larger designs for curtains, &c., without



“repeats.” The students were encouraged by money prizes to do their best, and from that period may be dated the extraordinary progress made in the Nottingham lace trade. It was soon found that native talent was quite equal to all the requirements of this beautiful manufacture; periodical competitions in design were stimulated by local prizes; English designers gradually superseded foreign artists; and in 1878 the undoubted merits of their work received recognition in the French capital itself, in the shape of a “diploma of honour” from the Paris Exhibition. One of the leading manufacturers of Nottingham, a warm supporter of the school of art, states that whereas only ten years ago he paid from £1,000 to £1,200 a year for French designs and to French designers, his present expenditure in that direction is not more than £50. Probably 1,500 young men are now engaged in that town as designers and draftsmen, with such success that in Calais—the chief seat of the French lace trade—the manufacturers last year petitioned the Government to assist them in establishing a school of art there, lest they should be left behind in the competitive race. Many of the Nottingham manufacturers compel their apprentices, by a clause in their indentures, to attend the school of art three times a week, a course which is more or less adopted in Aberdeen, Bath, Barrow-in-Furness, Hanly, Preston, and other places; indeed, the school is one of the most popular institutions in the town, and has, moreover, an invaluable adjunct in the museum established at Nottingham Castle. One firm alone pays £5,000 a year to seventy designers, including apprentices; and although many designs are still sent over from Paris, they are always put into the hands of English draftsmen before being put on to the machine. At Macclesfield, where the silk manufacture is the staple industry, the business of hawking French designs is gradually dying out, and only the other day a dealer in these commodities offered one of the students of the school of art regular employment in sketching and designing. Besides which it is well known that a large percentage of the “new French patterns” which arrive quarterly from Paris are really the production of English looms. The Macclesfield school is indeed found to be indispensable to the manufacturers of the town, amongst whom may be found seven or eight ex-students, and the designers trained therein work also for the cotton, linen, silk, and woollen textiles of other towns. Designs are wanted for almost everything that Macclesfield produces, and it is found here, as elsewhere, that the school course provides higher standards of excellence than are demanded for the customers for whom the manufacturers have to provide. The ability of the students is, however, utilised as fast as they can be trained, and it is expected that the demand will be further stimulated when a technical school is also established, and gives instruction side by side with its artistic neighbour. At Belfast the artisan classes are most numerous attended, and the trades of the town, including linen damask weaving, cotton printing, embroidery, ironwork (wrought and cast), lithography, and engraving, have all been directly benefited, most of the designers having been trained therein, several having had the advantage of a course of study at South Kensington; and the students include a large number of persons employed in the establishment of Messrs. Marcus Ward & Co. It is, however, regretted that the staple production of the town—linen damask—has not been more largely affected by the work of the school, for, though the patterns show a marked improvement, many of them are still execrably bad. A local museum of art objects, and especially of textile fabrics, is greatly needed, for the place is singularly devoid of artistic objects and influences, and, as the Free Library Act has recently been adopted by the town, it is hoped that

that steps will soon be taken to establish such an institution. At Birmingham great strides have been made in art manufactures during the last thirty years; public taste has been largely developed; and designers and art workmen trained in the school of art are now generally employed. Here, owing to the nature of the trades carried on, there is a great demand for good handicraftsmen; and one of the principal firms, which formerly employed many foreign designers, modellers, chasers, &c., now relies almost exclusively on native ability. At Colebrookdale the modellers and most of the designers for ironwork are, or have been, students of the school of art; and the same may be said of the factories of Messrs. Maw and others. At Glasgow the majority of those filling important posts in the factories have had the benefit of its training; and it is to be hoped that the town will not allow an institution of such great value to its manufacturers to continue so badly housed as it is at present. At Manchester some of the manufacturers are earnest supporters of the school; but complaints have been made that its work is not sufficiently comprehensive, being at one time too exclusively an art school, and at another too much a school of design. It is now, however, making good headway, and increasing its hold on the estimation of the public. At Stoke-on-Trent the school of art had in its earlier years a staunch and generous supporter in Mr. Herbert Minton, who insisted that his apprentices should attend its classes, and paid the fees of the girls during five years of their apprenticeship. His successors still insist on the attendance of the boys, and the school has turned out skilful workmen for the factories in large numbers, besides which ex-students are to be found in the several establishments, engaged as directors, painters, or designers, and in many cases they have superseded foreign aid. Pottery painting at Stoke has entirely changed its character since the establishment of the school of art, so far as its technical treatment is concerned, and the school has produced hosts of art workmen. At Halifax, sixteen years ago, all the principal appointments as designers were held by foreigners; now, however, matters are altogether changed, for they are almost exclusively filled by ex-students from the school of art, which is also largely attended by youths whose business it is to transfer "to point" on squared paper the designs of their masters, so that a thorough acquaintance with freehand drawing is highly essential to success. At Lambeth, a most important and extensive art manufacture owes its very existence to the influence of the neighbouring school of art, cordially welcomed and allowed free scope through the enterprise and encouragement of Messrs. Doulton, whose art pottery is distinctly original in conception and treatment. The Lambeth school always had a class of design, and about the year 1865 it occurred to Mr. Sparkes, then its master, that the students might as well make their designs in enamelled colours on the clay used for making tiles and other coarse ware as upon paper in water-colours. He thought this course would add interest to the work, but had no conception of the extensive industry to which the experiment would lead. This beautiful and popular ware is a most excellent result of a genuine experiment made with the capital and artistic taste of a manufacturer, developed by purely local means. No local school in any part of the Continent could have done more than the Lambeth school has done to back up by its best efforts the demands made from time to time by Mr. Doulton. It is a truly national production, and at the same time a local one, the direct outcome of the proper co-operation that ought to exist between schools of art and local manufacturers. This modern development of industrial art, in which some 350 persons are employed, mostly females, could not have taken place but for the school of art, which has supplied, almost without exception,

exception, the entire staff of the establishment, and continues to have the warm support of Messrs. Doulton, who, as one means of encouragement to the students, arrange that every certificate gained at the school shall carry with it an increase of salary. The school of art at Stourbridge, also, has had much influence on the glass manufactures of the district, and appears to have founded one important branch—etching on glass—which was started about twenty-five years ago. Cameo glass cutting has also been recently introduced, and great strides have been made in this as well as in other departments of the trade. Of this industry Sir Rupert Kettie says:—"Without speaking of the special manufacture revived in Venice, I can say with confidence that no country has at any time produced such pure brilliant flint-glass as the English makers now give to the world. As to design, whether in cut, engraved, or moulded glass, whether in rock-crystal, or cameo work, no such art glass was ever before seen as that which is now being produced in my own neighbourhood."

The system of loan collections supplied by South Kensington is of the most admirable character; and, as the Royal Commissioners expressed themselves, it would be well if it could be still further extended, and the collections allowed to remain longer at the towns to which they are sent. All technical schools and art schools should be in immediate connection with a museum. The eye sees in a moment what the mind could not understand from a written description. Hence the great value of object lessons. In most of the German towns I visited, collections forming a museum had been made, and as a rule the State assists the local municipal bodies in providing the funds, and also in supplying the collections for the provincial galleries and art schools. It is this way in France. The State assists and appoints the leading officers or directors, while all matters of detail and management are left to a committee of the municipal body. Invariably the importance of art and the necessity of art instruction are recognised, and local galleries and museums are established in order to make the instruction imparted more effective. Many of these museums are of no great value at first, excepting in the matter of the loans. It is always found that once a museum is established private individuals come forward with loans, which sometimes, and indeed often, lead to bequests and gifts, and in the course of a few years it grows into a considerable collection, proving invaluable to the students as object lessons, while it cannot fail to elevate the taste.

Moreover, special attention is paid to the casts and models, which are nearly always supplied gratuitously by the State to the art schools and academies. They are made under the supervision of its own officers and examples are never refused to towns or districts which desire to open art schools or galleries—the consequence is that the chief town of every district has almost invariably its own museum and picture gallery open on Sundays free to the people.

I may here say that the reproduction of these works of art can be done very economically when the State has good moulds and a proper workshop. We are already reproducing casts for our schools in Sydney, and I trust that the Board of Technical Education will be empowered to do much more in this direction. I shall have a recommendation to make on this subject further on; for no one can dispute the value of such collections to country districts, or the direct influence they give to schools of art or design.

The Commissioners on Technical Instruction report that the question of providing museums of art and industrial objects is still almost in its infancy in England;

England; and though Birmingham, Liverpool, Nottingham, and Manchester have established promising art galleries, and in other large towns also some interesting collections exist, there is yet no provision of this sort at all comparable with the amply furnished museums and galleries possessed by many provincial towns on the Continent, especially in France; and although we can scarcely hope to obtain in our provincial towns within an early date, such collections of rare pictures as have been acquired in some foreign towns through the influence of old traditions and special causes of distribution, much is possible for us in the direction both of augmenting our present resources and of bringing them to bear with greater effect on our art manufactures, and in vastly increasing the artistic power of our skilled artisans.

In the case of France, which stands at the head of artistically educated countries, the provincial museums have been largely assisted by the State, both by money and by contributions of pictures and other objects. The surplus stores of the Louvre are freely given to such galleries, and the supply of good copies and casts for the art schools is administered with a lavish hand.

It would, however, be erroneous to suppose that foreign provincial galleries lean entirely on the support of the central Government. The magnificent gifts and bequests of private individuals to the galleries of Limoges, Montpélier, Dijon, Nancy, Lille, and other towns, bear witness to the fact that local effort and enterprise are by no means exclusively British virtues, and they prove also the high value which the presence of a local gallery has in stimulating the task and attracting the munificence of the inhabitants.

Municipal and other local authorities, as well as the ratepayers at large, should be induced by every means to acknowledge and discharge the responsibilities they are under to the community in this respect. And to this aim no more valuable accessory can be provided than that of museums, well supplied with examples bearing on the industry of the town or district and placed, if possible, in the same building with, or in close proximity to the school of art.

Modifications have been made since my last report in the various methods and systems. New schools of art have been founded, and institutions created—notably in Germany and Austria—having for their object the encouragement of the arts applied to industries with a view to the development of commerce.

It is impossible to teach successfully, so that the students may learn how to compose artistically, without a museum, and the more richly this is endowed with art objects of all kinds the more useful it must be. In Europe the great importance of this is fully understood, and the various nations have set about this work in earnest. Collections are sent to provincial museums from a central one, and duplicates of rare works are moulded in plaster, reproduced by electro-metallurgy, while photography is also largely employed in copying such work as may be useful, and which could not otherwise find its way to the provinces. The museums of South Kensington, Berlin, and Vienna keep regularly at work many skilled workmen in the preparation of these reproductions, which answer every purpose of the students, being perfect facsimilies in size and form of the originals.

It is thus easy, and comparatively at a cheap rate, to obtain examples, in these reproductions, of the best works of art in relation to the industries of a country; and these examples should be on view and at the convenience of students at all times in a museum attached to and in connection with the central and provincial

provincial schools of art. By such means a correct taste for the beautiful will be fostered, and as the schools are open to all, the youth of Australia will have the same opportunities as their contemporaries in other countries to learn the best methods of fabrication and decoration, and by studying attentively the grand works before them, to work out original ideas, adapting their designs to the requirements of their country, and impressing them with a sentiment entirely Australian.

I shall now proceed to describe the schools and the methods which prevail in England, France, Germany, Belgium, and America, for teaching drawing, not, as I before stated, that any national system exists in either of these countries, but simply to speak of the schools and their various programmes. It appears that in teaching drawing much more depends upon individual teaching than in teaching the exact sciences. With these, by means of reasoning and experiment, actual truth can be arrived at, but with art it is quite another matter. My experience leads me to the conclusion that if the child were taught to make his own impression of an object in the Kindergarten and infant classes, that is to say, if he were taught his letters by being made to copy them from solid objects, with a piece of chalk or a slate pencil, the great difficulties we now find in bringing together the eye and hand would no longer exist, but that it would become almost natural for a child to draw correctly from the object or model, and that geometry and perspective would eventually be much easier of acquisition. We all know how the drawing of maps on blackboards facilitates the learning of geography, but if with the very first attempts at tuition the hand and eye were brought together, it stands to reason that drawing must be acquired much more readily than when this important matter is left until the child is 8 or 10 years of age, or even older, at which period the child will naturally have more difficulty in trying to produce with his hand the impression any object has made upon his eye.

Up to the present time schools have practically taught that letters were the only possible form of expression. This is not as it should be. In all future there must be such keen and serious competition between nations as regards production and economy of manufactures, that we ought to realize the necessity of going at once to the root of the business and teach the young idea how to shoot in the proper direction from the beginning, economising his time and making the work easier to him.

That this can easily be done I am thoroughly convinced, as the experience of all the great educational reformers goes to prove that the infant mind can be easily exercised and taught to express itself in the language of form, and even of colour. Developed in the manner I have indicated, the mind will be gradually brought to view all things with a correct eye, and whatever work the child may be engaged in later on, it will be treated in a manner more or less artistically. I may quote here what has been stated by an eminent American authority, Dr. Woodward, of the St. Louis Manual Training School. He lays it down as a self-evident conclusion : "That it is the birthright of every child to be taught three methods of expression—(1st) by the written, printed, or spoken word ; (2nd) by the pencil or brush, using the various kinds of graphic art ; (3rd) through the instrumentality of tools and materials which enable one to express thought in the concrete."

I shall do little more than enumerate the various art schools where the teaching is confined to the fine arts to the exclusion of what we may term industrial art, the chief object of my inquiry being to gain information as to the instruction  
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of the masses in drawing, so as to enable them to turn such knowledge to an industrial account. My report will treat fully the methods which have been employed to carry into effect this desirable work, while I shall scarcely do more than to give the programmes of the great art schools in appendices.

The schools of the Royal Academy gratuitously provide means of instruction for students of painting, sculpture, and architecture, students providing only their own materials. They consist of the antique school, the preliminary school of painting, the upper school of painting, the school of drawing from the life, the school of modelling from the life, the architectural school, and the perspective school. There is a most excellent library of works of art open to the students, and courses of lectures on painting, sculpture, architecture, chemistry, and anatomy, to which students are admitted.

The Slade Art School, under the direction of Professor Negros, is a department of University College, and an excellent institution, open to both male and female students. It gives instruction in painting, drawing, modelling, and etching.

Six Slade scholarships in fine arts have been founded—open also to male and female students—and lectures are given on anatomy, the science of perspective, and the chemistry of materials used in painting.

The Royal Institute of Painters in water-colours has schools which provide gratuitous instruction for students of water-colour painting, the student providing his own materials. Applicants are required to produce, as a specimen of ability, two drawings in each department of study they propose to follow. Before sending in specimens of work candidates must obtain from the Royal Institute, Piccadilly, through the written request of any member of the Institute, or other artist or person of known respectability, a printed form of application, which must be filled up and sent in with the specimens to the Institute on or before the 1st day of September in each year so that they may be submitted to the Council. If approved the applicant is admitted as a probationer, and two months are allowed to prepare a set of drawings for the schools. Unsuccessful candidates may renew their applications with a different set of drawings. The period of studentship is limited to two years, but may be extended at the discretion of the Council. The student must be under 25 years of age, otherwise he is ineligible.

Notice of teaching at drawing in elementary schools will be found in Appendix.

I shall not enter into the subject of art history, or have I inquired into the origin and development of schools of art. I shall simply state that comparatively little was done to impart instruction in art in a comprehensive manner until after the first great International Exhibition of 1851. The want of instruction in design had operated for years against English industrials, and Parliament had been often invoked to bring about a better state of things. A far greater development had been given to art, and greater encouragement to industry, by Continental nations than in England, whereas in the latter country it was far more needed, as England was eminently the first of all manufacturing nations. Mr. Dyce, R.A., reported in 1840, and pointed out the differences between English and French teaching. He pointed out that there was "no circumstance in France connected with the application of design, not merely to the silk manufacture but to every branch of industry, that  
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deserves more special notice than the high estimation in which industrial artists are held, and the free and unrestrained exercise of their judgment and taste which is consequently allowed to them in all matters over which their peculiar abilities ought properly to give them control. A French pattern designer is looked upon in his sphere precisely in the same light as a professor of fine art. You may employ him or not as you think fit, but having given him a commission, it is he, not you, who is responsible for the merits of his performance; and this does not terminate in the design merely; his taste and judgment must be equally allowed to control the manner and process of reproduction." He goes on to say, "It may appear incredible, but I assert it without fear of contradiction that there are few, if any, instances in Great Britain of industrial artists who are employed as responsible persons, that is to whose judgment manufacturers give the least deference, whose productions can be looked upon as original works, or who are allowed even to have a voice as to the mode in which the patterns they are employed to make should be executed."

I mention this to show the state of things as regards art so late as in 1840. How schools were instituted with a view to raise the taste of the great mass of artisans, rather than by special efforts to make a few eminent designers.

The Exhibition of 1851 made it patent to every thinking person that energetic steps must be taken, and that at once, so various attempts were made, and in the minutes for the re-organisation of the schools of design in 1852, and the formation of the Department of Practical Art to which reference has already been made, states the three principal objects of the new department were to be:—

1st. The promotion of elementary instruction in drawing and modelling; 2nd. Special instruction in the knowledge and practice of ornamental art; 3rd. The practical application of such knowledge to the improvement of manufactures.

Examples for drawing were therefore prepared and offered to the elementary schools at half cost, and a class for the instruction of teachers of such schools was opened at Marlborough House. Special classes were also established for technical instruction in art, which classes were supplemental to the courses of instruction in drawing, painting, modelling, and designing carried on at the metropolitan school, Somerset House, where a training class was established with a systematic course of instruction for masters of schools of art.

In August, 1853, the training class was moved from Somerset House to Marlborough House, where temporary school-rooms were erected. In 1854, inducements were offered to teachers of elementary schools to pass examinations in drawing by the offer of payments on the results of their instruction of the pupil-teachers in their schools; and the pupil-teacher system was extended to schools of art, a payment of £15 a year being allowed for each pupil-teacher. In 1855 the Department offered prizes to children in elementary schools taught drawing by masters of schools of art. In 1856 these schools were collectively examined at schools of art by the inspectors of the Department, and in 1857 a payment of 3s. for every child who gained a prize was given to the art master who had instructed him. In the same year an augmentation grant of £5 was made to the salaries of teachers of elementary schools who had passed examinations in drawing, and taught the subject satisfactorily in their schools. In this latter year also, the offices of the Department and the art training schools were removed to South Kensington, and a regular inspection of art schools organised.

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This system was changed in 1864, and schools of art and art classes now send their works annually in April to South Kensington, where they are examined by Committees of Examiners who award the marks on which payments are made, and medals and prizes given.

Aid is given to elementary schools, training colleges, and schools of art, and art classes. This aid may be obtained not only by public elementary schools under the inspection of the Education Department, but also by elementary schools not in connection with it. By the minute of the 26th May, 1885, to which I before alluded, these public elementary schools could elect to receive aid either from the Science and Art Department or from the Education Department after the 31st December, 1885. But grants from the Science and Art Department will cease to be made to schools under the inspection of the Education Department from and after the 31st March, 1887. The children and pupil-teachers of an elementary school are examined once in the year. If the aid be granted by the Science and Art Department it consists of payments of 1s. 6d. for each child who passes in drawing to scale, and of 1s., 1s. 6d., or 2s. 6d., according to the merits of the papers worked, in respect of the other first grade subjects—freehand-drawing from copies, and from models, and practical geometry. A payment of 5s. is also made for each subject in which a child passes the second grade examination in freehand, geometry, perspective, and model drawing, and of 10s. for each subject of that examination in which a paid monitor or pupil-teacher passes. Grants in aid of the purchase of suitable apparatus is also made. First grade prizes and certificates are given to those children, and second grade prizes and certificates to those pupil-teachers, whose papers reach a certain standard of merit. If the aid be granted by the Education Department it consists of a grant made on examination in drawing as a class subject under the Education Code, amounting to 1s. or 2s. for each child in average attendance if the inspector's report on the examination is "fair" or "good." The examination of elementary schools are conducted by local inspectors appointed by the Science and Art Department.

With reference to the training colleges, annual examinations are held about October at the training colleges under the inspection of the Education Department. The subjects of examination are freehand-drawing, from flat examples, practical geometry, linear perspective, model-drawing, and drawing on the blackboard. Payments of 10s. are made to the authorities of training colleges for each subject of the examination in which a student passes, and prizes and certificates are given to all candidates whose papers are marked excellent. Grants are here also made towards the purchase of suitable apparatus.

In the schools of art, and art classes there are twenty-three stages of art instruction towards which aid is granted to schools of art and art classes, which have been duly recognised by the Department. This aid to schools of art and art classes is in the form of:—

- 1st. Examinations in which prizes and medals are awarded, held at all places, complying with certain conditions.
- 2nd. Payments on the results of examinations, and on the works executed in the school or class during the year.
- 3rd. Scholarships, local exhibitions, and free studentships at the National Art Training School and local schools of art.
- 4th.



- 4th. Supplementary grants in respect of teachers, art pupil-teachers, modellers, and other students.
- 5th. Building grants and grants towards the purchase of examples, apparatus, &c., &c.
- 6th. Special grants and loans of works of art, books, &c.

Payments are made on the results of the examination of students of the industrial classes, all those whose incomes do not exceed £200 a year being included in this category, or of their children. There are two kinds of examinations, first, second, and third grade personal examinations, held about May; and second, the examination of works executed by registered students in schools and classes, which works are sent to the Science and Art Department for that purpose in April. The payments to schools of art and art classes are as follows:—

- (a) 10s. for every paper of the second grade examination, marked "pass" or "excellent."
- (b) £1 10s. for every paper of the third grade examination in stages 8, 6, 5a, and 5b, marked "pass" or "excellent."
- (c) £1 10s. for every paper marked "fair," and £3 for every paper marked "good" at the annual third grade examination.
- (d) Two pounds, or a sum in proportion to the merit and quantity of the works sent up, but not exceeding £2, on account of every qualified student who submits satisfactory work for examination at South Kensington.
- (e) Payments of twenty-five or twenty shillings, according to its merit, for every satisfactory work in elementary modelling, executed at the local examination by a student who has attended at least forty lessons in modelling during the school year.

Other payments which are made to schools of art only are:—

- (f) Three pounds on account of a free studentship for every draughtsman, designer, modeller, or handicraftsman, who having been two years in a school of art, is recommended jointly by the local committee and by the examiners of the Department, and who submits a satisfactory year's work.
- (g) Fifteen pounds for an art pupil-teacher in a school of art in which twenty students of the industrial classes are satisfactorily taught, and £30 for two art pupil-teachers in a school in which fifty or more such students are satisfactorily taught.
- (h) Five pounds for every student, being or intending to become an art workman, or a designer for manufacturers, trained in a school of art, who obtains a national scholarship or admission to the national art training school.

Prizes are awarded to all registered students of schools of art and art classes whose papers are marked "excellent" in the second or third grade personal examinations. Medals and other prizes are awarded for the best work which have been sent up for examination, and have been selected to enter into a national competition between the works of all the schools of art and art classes in the Kingdom.

Certificates as teachers are granted to candidates who pass certain examinations. They are termed the Elementary School Teachers' D, second grade; the Art

Art Class Teachers' intermediate, and the Art Master's certificate (third grade) respectively. Other grants are also given for building apparatus, works of art, and other purposes.

National scholarships in the National Art Training School, with allowances of from one to two pounds (£1 to £2) a week, are granted to a limited number of duly qualified students from schools of art and art classes who are handicraftsmen engaged in producing works of decoration or art manufacture. Studentships in training in the National Art Training School, with allowances of from fifteen to twenty shillings a week, are also granted to students of schools of art who propose to become teachers. There are also free studentships in the National Art Training School awarded to students who have paid fees for two consecutive terms at that school, or any school of art, and have distinguished themselves by passing certain of the Department's examinations in art.

In 1855 there were 200 schools of art, with eighteen branch classes, and a total of 36,960 students; 488 art classes, with 23,410 students; 4,637 elementary schools, at which 810,079 children and pupil-teachers were taught drawing, of whom 530,286 were examined. There were also fifty training colleges, with 3,578 students in training examined in drawing, of whom 879 students and teachers obtained certificates.

The whole number of persons who received instruction in art in some form through the agency of the department was 889,149. All further details will be found in Appendix.

In accordance with the recommendations of the Royal Commission on Technical Instruction above referred to, and to make the teaching of rudimentary drawing a part of the regular instruction in elementary schools, drawing has been included among the class subjects in the code of the Education Department laid before Parliament in 1885, and arrangements have been made to cover the period of transmission ending the 31st March, 1887. Since the issue of this minute 376 schools have applied for examination in drawing as a class subject, but other schools have discontinued instruction in drawing on the ground that the grant for it will be no longer in addition to the annual grant from the Educational Department. This clearly proves the necessity for further legislation, and that teachers be compelled to work in a given direction or be superseded. Incompetence in teachers needs also to be more strictly attended to by the inspectors, for where national interests are concerned the whims and caprices of individuals must be determinedly swept aside, and teachers must be made distinctly to understand that if they will not honestly and energetically teach drawing their positions will be filled by those who will.

Mr. Bowler, the Assistant Director for Art of the Science and Art Department, states that drawing was introduced as a class subject into the code of the Education Department for 1885 and 1886 with the following specification:—Standard I.—Drawing freehand and with the ruler of lines, angles, parallels, and the simplest right-lined forms, such as some of those given in Dyce's drawing-book. To be drawn on slates. Standard II.—The same as standard I, but drawn on paper. Standard III.—Freehand drawing of regular forms and curved figures from the flat; simple geometrical figures with rulers. Standard IV.—Freehand drawing from the flat and from simple rectangular and circular models; drawing to scale geometrical figures with instruments.

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Standard V.—The same as Standard IV, with the addition of easy common objects; plans and elevations of plane figures and rectangular solids in simple positions; simple scales.

Standard VI.—The same as the 5th, but with objects of greater difficulty.

The same as 5th, with sections.

Standard VII.—Drawing any common objects and casts of ornament in light and shade.

The same as VI, but with circular solids and sections.

To these instructions is added a note that “in order to interest the children it will be advisable to teach them to draw as early as possible from actual objects, such as the doors and windows, furniture, and apparatus of the schoolroom.

The minute issued by the Lords of the Committee of Her Majesty's Most Honorable Privy Council on Education, at South Kensington, on drawing as a class subject under the code of the Education Department is as follows:—

1. Drawing having now become a class subject under the code, all grants, including those for payments on results, prizes, and examples for the instruction of drawing of children in public elementary schools will cease to be made by the Science and Art Department from and after the 31st March, 1887.
2. An elementary school, the school year of which terminates before the 1st January, 1886, will be examined and receive grants from the Science and Art Department according to the present provisions of the Art Directory.
3. An elementary school, the school year of which terminates after the 31st December, 1885, and before the 1st April, 1887, may elect to be examined during that period, either for grants from the Science and Art Department under the Art Directory, or for grants from the Education Department for a class subject under the code, provided that in the latter case arrangements are made for teaching the subject throughout the school in accordance with the schedule of the code six months before the end of its school year, and that notice to that effect be given to the Science and Art Department at the same time.
4. In schools in which drawing is now being taught under the Science and Art Department, the examination in the first year under the code need not extend beyond the requirements of the fifth standard, and the higher grant, 2s., will be awarded if the results of the examination be good.
5. In schools in which drawing is taken for the first time, the examination need not for the first year extend beyond the requirements of the fourth standard, and the higher grant, 2s., will be awarded if the results of the examination be good.
6. In schools in which it is desired to make a separate classification for instruction in drawing, managers shall be at liberty to class the scholars for examination in standards which do not correspond with the ordinary standards in the school. In every such case a schedule must be prepared, and a duplicate preserved, showing the names of all the scholars and the standards in which they have been respectively presented for the drawing examination. No scholar should be presented a second time in the same or in any lower standard.

7. The examination in drawing as a class subject under the code will take place within a month before the end of the school year, and it will be conducted by the local superintendent of the Science and Art Department, who for this purpose will be deemed an inspector of the Education Department.
8. Pupil-teachers may be examined at the same time in the second grade art subjects, or they may sit at the ordinary May examinations at any centre. Payments on their account will continue to be made by the Science and Art Department as at present.
9. This minute does not affect the grants from the Science and Art Department for the teaching of drawing in elementary schools which do not receive grants from the Education Department, or from the Commissioners of National Education, Ireland.

I have reproduced the approved illustrated syllabus of the course of instruction in drawing as a class subject in plates. (*See Appendix.*)

The following observations were also issued with the plates:—

It must be clearly understood that the diagrams which are here given on a reduced scale are intended solely to illustrate the schedule of the code, and to give an idea of the nature and the degree of difficulty of the drawings which children will be expected to practice in each standard.

Children in the first three standards should make their freehand and model drawings of a size to fairly fill slates or paper 6 or 7 inches in length. Children in the higher standards should be exercised in enlarging and reducing their freehand examples, and should generally draw on a larger scale than the children in the lower standards.

In the use of instruments children in the first three standards should not be required to do finer work than is involved in making circles of half an inch radius.

In the higher standards smaller dimensions may be employed.

The authorities of the Art Division of the Science and Art Department wisely recognised the fact that in order to teach drawing the first thing to do was to provide teachers. The development just described of art instruction in England would not have been possible had it not been for the institution of the National Art Training School. This school is by far the most important element in the English system of teaching drawing, and to the excellence of its direction may be ascribed the many admirable teachers who have wrought this marvellous change.

To have brought this school to its present position has been no ordinary task, and perhaps it is only to those who have made the subject a close study, that the difficulties are thoroughly apparent. It must be a work of time to adapt the subject of drawing to the varying capacity of the pupils, and to approximate towards a systematic arrangement of work in all the different grades. At the beginning students enter without any great skill, and have in the first place to be taught to draw. The attention that is now paid to this subject, to a great extent, does away with this difficulty, for, although somewhat tardily, the importance of teaching drawing in elementary schools has been recognised throughout all civilised nations, the only question being, how to teach in the most perfect manner. It is obviously the duty of all directors of training colleges and normal schools to address themselves earnestly to this question, for upon the graduates of to-day will depend the results

results of the future, for it must be borne in mind that it is no longer sufficient for a student, aspiring to become a teacher, to be able to draw and gain prizes for his work in the schools, but he must know how to teach, and he can only obtain this qualification by constant practice in teaching, combined with skill and experience of educational methods. As soon as this is fully understood and acted up to, children will learn to draw as easily as they learn to read and write, and by these means, development of the elements of judgment and good taste will be provided by the instrumentality of those future teachers who are now learning their profession in the normal schools. It is impossible to over-estimate the importance of this class of school. Teachers must be taught how to teach. The pedagogics of art must be thoroughly studied. Conferences of normal school-teachers should be frequent, so that every opportunity of comparing notes and hearing each other's opinions should be secured, as mutual help is indispensable in order to secure uniformity of action and more perfect development. It is therefore greatly to be desired that the National Art Training School of South Kensington will exert itself further in this direction, now that drawing has been introduced under the code of the Education Department as a class subject into all elementary schools; that it will collect all the information as to methods of instruction from other countries, and determine, by actual experiment, upon the best means of teaching drawing in all elementary schools. I am aware the matter rests with the Education Department, but virtually the success of this great progressive movement will remain with the institution from which all the teachers will emanate; and, as yet no definite or comprehensive system has been determined by experience, I trust it will be the province of the National Art Training School to develop some rational method, thoroughly test it by experiment, and then, when assured of its value, strenuously insist upon its application.

This school, which has already been the means of doing so much good, is a development of the former School of Design and Central School of Art at Somerset House, which in 1853 was removed to Marlborough House and opened under its present appellation. In 1856 it was transferred to South Kensington, where the number of students rapidly increased. The Royal Commission report that an important change has taken place in the school since 1871, when, in order to fulfil more efficiently its primary object of training teachers, an entrance examination was imposed. In the year 1880-1 there were 128 students—94 males and 34 females—attending the schools without paying fees; 47 students were admitted on payment of half fees, and from 759 students—359 males and 400 females—the sum of £3,022 was received in fees. The course of instruction includes 23 stages, in the highest of which, stages 22 and 23, the student takes elementary and applied designs.

Certificates of competency to teach the subjects comprised in these various stages of instruction are given to candidates who pass the necessary examinations. These are:—

- (a.) The preliminary or art teacher's certificate.
- (b.) Art certificates of the third grade.

Accompanied by Mr. Sparkes, the principal of the school, I made myself thoroughly acquainted with the building and the various classes. I examined the work in progress on many occasions. It was most satisfactory, especially the  
drawing

drawing and modelling from the antique and the life. The lectures on anatomy, decorative art, and perspective are most excellent, and leave little to be desired in the way these subjects are taught.

The stages of instruction, in art alluded to above, are as follows, but the progressive arrangement is varied according to circumstances :—

- Stage 1. Linear drawing by aid of instruments, including linear geometry, mechanical and machine drawing, perspective, details of architecture, and sciography.
- Stage 2. Freehand outline drawings of rigid forms from flat examples or copies.
- Stage 3. Freehand outline drawing from the "round."
- Stage 4. Shading from flat examples or copies.
- Stage 5. Shading from the "round" or solid forms, and drapery.
- Stage 6. Drawing from the human figure, and animal forms from copies.
- Stage 7. Drawing flowers, foliage, and objects of natural history, from copies.
- Stage 8. Drawing the human figure, or animal forms from the "round," or nature.
- Stage 9. Anatomical studies drawn or modelled.
- Stage 10. Drawing flowers, foliage, landscape details, and objects of natural history, from nature.
- Stage 11. Painting ornament from flat examples.
- Stage 12. Painting ornament from the cast, &c.
- Stage 13. Painting (general) from flat examples, or copies flowers, still life, and landscapes.
- Stage 14. Painting (general) direct from nature, flowers, or still life, landscapes, and drapery.
- Stage 15. Painting from nature, groups of still life, flowers, &c., as composition of colour.
- Stage 16. Painting the human figures, or animals, in monochrome, from casts.
- Stage 17. Painting the human figure, or animals, in colour.
- Stage 18. Modelling ornament.
- Stage 19. Modelling the human figure, or animals, and drapery.
- Stage 20. Modelling fruit, flowers, foliage, &c., from nature.
- Stage 21. Lime sketches in clay, of the human figure, or animals, from nature.
- Stage 22. Elementary design, including studies treating natural objects ornamentally, ornamental arrangements to fill given spaces in monochrome, or modelled ornamental arrangements to fill given spaces in colour, and studies of historic styles of ornament drawn or modelled.
- Stage 23. Applied designs, technical or miscellaneous studies, including machinery and mechanical drawing, plan drawing, &c., done from measurements of machines, buildings, &c., architectural design, ornamental design with figures as applied to decorative or industrial art, both flat and in relief.

Students

Students of schools of art who propose to become teachers, and who have taken the first certificate of the third grade, are eligible to compete for admission to the training school, with a maintenance allowance of ten, fifteen, or twenty shillings weekly, which may be increased to thirty-five shillings per week. Students who have taken the art class teachers' certificate may compete for admission as free students. Students of schools of art may compete for national scholarships of the value of from £1 to £2 per week, tenable at South Kensington for one, two, or three years.

The staff consists of a principal (Mr. Sparkes), a registrar, six assistant teachers, an instructor in decorative art, lecturers, occasional professional assistants, and a visitor (Mr. Poynter, R.A.)

Mr. Sparkes says that "in the National Art Training School technical matters connected with various art industries always receive attention in the lectures on design; and the provincial masters, many of whom are acquainted with the technique of several trades, do their best to meet the needs of local manufacturers; if they do not acquire sufficient technical knowledge to make their schools the school committees have the remedy in their own hands. The National Art Training School is now so much in demand that additional accommodation is much needed, and several more studios might be utilized. The greatest good fellowship exists among the students, who have various accessory organizations for cricket, boating, music, &c.; and in October a holiday sketching club produces some 700 or 800 works for adjudication. At Halifax and other places there are also art clubs in connection with the schools of art, and the members are from time to time represented on the walls of the Royal Academy. It may be added that the students of the National Art Training School are invited to the Royal Academy lectures, and the academy in return receives from the schools of art some of its most promising recruits. It has been suggested that the training imparted in the schools should lead up to a certificate or degree, which should be to the student a recognized stamp of merit, akin to that which is conferred at the Universities for scholarships; such a distinction would be both acceptable and useful, and the proposal is worthy of consideration. The national scholarships, of which there are twelve, were established to enable advanced students, who have given evidence of special aptitude for design, to prosecute their studies for a time in the training school and museum of South Kensington. The competition for these scholarships takes place in February and September, and students already engaged in designing for or producing works of art manufacture, are regarded as the most eligible candidates. When elected they receive free instruction and allowances for maintenance. National scholars and students in training may also in special cases receive grants to assist them in visiting foreign schools and galleries.

From 1863 to 1884, 145 national scholars, including 5 female students, have been received at the National Art Training School. Of this number 90 left it to enter upon engagements as designers, modellers, draughtsmen, decorators, &c., in connection with various art industries; 9 were employed in like capacities by the Department of Science of Art; 14 received appointments as masters or assistant masters of Schools of Art, 2 were drowned, 2 died, 2 resigned, and 1 was dismissed before the period of training expired. Respecting 8 others there is no information, and the remaining 17 are still in training at South Kensington. Of those

those who steadily devoted their attention to the object for which they were trained, many have since become distinguished for the excellence of their work, a fact which is the more gratifying when it is remembered that they have for the most part risen from a comparatively humble position. An excellent etching class forms also a part of this institution, conducted by Mr. F. Goulding.

The students of the National Art Training School have immense advantages in the proximity of the South Kensington Museum, to which they have free access. Here objects have been collected with a view to illustrate the history, theory, and practical application of decorative art. These are reproductions of the most celebrated masters, standard works of decorative art, modern pictures, sculpture, and engravings, architectural illustrations, building materials, naval models, educational apparatus, books, &c., &c.

The Picture Galleries were commenced by a princely gift of the late Mr. Sheepshanks, which was accepted by the Board of Trade in 1857. Thus a gallery of British art was founded, comprising British paintings in oil and water colours, drawings, etchings, and sculpture.

The Art Library of the Museum contains upwards of 52,000 volumes, 19,000 drawings, 51,000 engravings, and 53,000 photographs relating to art, while the educational and science library contains 59,736 volumes, chiefly on educational and scientific subjects. Free tickets of admission can be obtained on application to the secretary of the Science and Art Department, by (*a*) persons engaged in teaching, and certificated either in second or third grade art; (*b*) teachers of public elementary schools, holding certificate of merit of Education Department; (*c*) students of Royal Academy of Arts; (*d*) students attending local schools of art; art classes, or training colleges, who have been successful in second grade examination, or who have taken medals, medallions, or other Department prizes; (*e*) persons qualified to earn payments on results of science instruction. All students must apply through the secretary, head teacher, or principal of their school, class, or college.

A course of twelve lectures on anatomy, as applicable to the arts, is given in each term. The Spring course may be attended by ladies. Any person may at any time when the Museum is open to the public, sketch or make notes of any objects in the museum, provided such copying does not necessitate his or her using an easel or extra seat, or otherwise obstructing the circulation of visitors. Any person wishing to copy by using an easel, can do so on any students' day, under proper arrangements to prevent inconvenience to the public. The following are exceptions, viz.—(*a*) the paintings in water colours, to copy which no permission is granted; (*b*) objects on loan can only be copied on production of the written permission of the owners; (*c*) pictures in the Sheepshanks' gallery, to copy which special permission must be obtained. Forms of application for permission are supplied by the attendant in the gallery, or will be sent in reply to a letter addressed to the Director, South Kensington Museum. No application to copy the works of any living artist can be entertained, unless it be accompanied by the written permission of such artist. Such permission will only allow of works being copied by means of water colours or on porcelain, or by drawing or engraving, copying in oil not being permitted. Applicants must, if required, send specimens of their competency. No copying can be permitted, except on the days devoted to study, and not more than four persons can be admitted at the same time to work in any apartment, and no work can be removed from the walls for the purpose of copying.



By donations and purchases the Museum has been greatly enlarged from time to time. The grand cast of Michael Angelo's David, presented by the Grand Duke of Tuscany, with specimens of decorative and other sculpture in marble, stone, and terra-cotta, together with the Guardini collection, laid the foundation for the present collection of decorative carving, modelling, and sculpture.

The Lords of the Committee of Council on Education in 1863, directed that future purchases should be confined to objects wherein fine art is applied to some purpose of utility, and that works of fine art not so applied should only be admitted as exceptions, and so far as they may tend directly to improve art applied to objects of utility. The decorative art of all countries should be completely represented. Second-rate works should only be acquired as substitutes until better work can be obtained. Where the taste of the age or country has been low, few specimens only will be necessary. Original works are to be obtained as far as possible; but where this would seem to be impracticable, the system hitherto pursued of representing the finest known examples of electrotypes, casts, and drawings will be followed,—it being always kept in mind that the aim of the museum is to make the historical and geographical series of all decorative art complete, and fully to illustrate human taste and ingenuity. All this was carried into effect in the most perfect manner; and, as a collection of decorative art, South Kensington stands at the head of all museums. Mr. Donnelly, in his history of the Science and Art Department, states that the expediency of obtaining reproductions, by casts, photographs, and electrotypes, of valuable works of art, had been early recognised by the council; and in 1864 a minute was passed with the view of establishing relations between the Department and continental museums. A list of such works of art was prepared, and the publication of an international art inventory was commenced, but was discontinued in 1879. Many of the finest objects of art are preserved in continental churches and palaces, and it is not probable that they will ever become purchasable; but admirable substitutes of them may be easily obtained by various modes of reproduction, with perfect safety to the originals. In 1867, therefore, His Royal Highness the Prince of Wales entered into a convention with several of the princes of the reigning families of Europe for promoting the reproduction of works of art, for the benefit, by exchange, of the museums of all countries. A number of important reproductions of monuments of various styles of art were thus procured—such as the Trajan column, the fire-place from Bruges, and Adam Krafts' sculpture from Neuremberg.

The collection of casts of classic sculpture illustrating the history of Greek art emanated from a proposal by Mr. Walter Perry, who was deputed to visit the principal galleries and museums of Germany and Italy, and to make the collection.

There is also at the far east end of London a branch in connection with South Kensington, known as the Bethnal Green Branch. A constant exchange of pictures, decorative works, &c., is constantly being made from South Kensington. It, moreover, contains departmental collections of animal products, illustrations of food, waste products, &c.

The collection of national portraits is now at Bethnal Green on loan from South Kensington, consisting of 633 paintings (mostly in oil colours), 32 miniatures, 28 busts in marble, 14 in terra-cotta and plaster, 11 electrotyped, and

18 electrotyped effigies from ancient tombs, &c. The central floor of the museum is now entirely occupied by oil and water-colour paintings, and a variety of art objects, all lent by various owners. This museum has been productive of a great deal of good.

South Kensington Museum extends its usefulness to the provinces by loans of objects to local museums and art exhibitions. The influence on public taste is by these means much enhanced for this circulation of objects of art workmanship is very acceptable and highly useful to a provincial public. During the period from 1864 to 1880 no fewer than 258 collections were thus sent out from South Kensington, extending the influences of its teaching throughout the entire kingdom.

The Finsbury Technical College of the City and Guilds of London Institute gives instruction in applied art by art lectures, studio courses, in which practical instruction is given in drawing and design, in elementary design, and application of design to special industries.

Elementary design includes ornamental arrangements to fill given spaces, decoration in monochrome, in colour, in relief plants and flowers arranged ornamentally, and drawn without backgrounds, with suggestions for colour derived from them. In the application of design the chief topics are—Internal decoration, domestic, ecclesiastical, and general furniture, with special reference to the requirements of cabinet-makers; fabrics; metals wrought, chased, and cast; the precious metals, silversmiths' and goldsmiths' work; stone-carving, inlaying, and moulding; wood-carving, inlaying, and staining; glass, stained, painted, and engraved; mosaic, &c.; engraving, etching, and lithographing; lace and embroidery, pottery, wood-drawing for illustration and typographical ornamentation.

Technical painting includes (1) painting in water colours, tempera, fresco, and water glass; (2) painting on canvas, silk, satin, or cloth, in oil, encaustic, or wax; (3) painting on furniture, panels, and on metal grounds prepared with different textures; (4) painting on pottery.

There is also a life class where painting and modelling from nature are practised; modelling in clay, terra-cotta, or wax for carvers, plasterers, art metal workers, &c.; and instruction will be given in modelling from casts, showing good examples of the different styles and periods of architecture and ornamentation, from plants, flowers, and objects of natural history, from the antique, life, costume, and from drawings and sketches, moulding and casting.

There are also classes for ornament in plaster, raised and incised; tapestry painting, by means of a process which produces durable and marketable results; pottery painting, repousse metal work, cabinet-making, and design in wrought-iron work.

Mr. Brophy has special classes for cabinet-makers, designers, and others. His system of teaching is to make the students make a firm outline, ink it in, and sometimes to complete in colour, to form a simple design for inlaid work, or to fill in a space for decoration. He sets good work for his pupils to copy from, such masters as Durer, Rembrandt, giving them a *précis* of the history of the period and of the art. The students who were in the lithographic class, sketch with the pen, thus  
habituating

habituating themselves to its use from the beginning, and to the effect it produces. The students, both in this and the other classes, were doing their work well, and seemed intelligent and earnest.

The South London Technical Art School is also a branch of the City and Guilds of London Institute, where the course of instruction is arranged to meet the requirements of all persons working at plastic art, such as carvers in wood, stone or marble masons, plasterers, die sinkers, potters, &c. The practice here is carefully adapted to the technical wants of individual students.

There are excellent classes of design, elementary and advanced. The Superintendent of studies is Mr. J. C. Lewis Sparkes.

Mr. Hugh Stannus is both lecturer and teacher in the class for advanced design. He directs the attention of his pupils to practical work, and the designs for tiles, decorative panels, pottery, and textile fabrics by the students are satisfactory and highly creditable.

The pupils in the wood-engraving class, under Mr. C. Roberts, also do fair work. Four students work at each table which has an elevated block in the centre to carry the lamp and water lenses. Students are admitted to this class after having taken the second grade certificate of the Science and Art Department. Specimens of their work can be seen at the offices of the Board of Technical Education, in Phillip-street.

In the class of elementary design, now taught by Miss Mary Butterson, students must also have taken a second grade certificate of the Science and Art Department. Instruction is given by lectures, and the students practice the drawing of flowers, foliage, and natural forms, afterwards arranging them as designs. The work is arranged to suit many industries, such as decorators, lithographers, engravers, and designers for textile fabrics, pottery, and surface decorating of all kinds.

There is also a very good life school, with Mr. J. H. Smith as teacher. In drawing and painting the study of the nude figure is carried on to its utmost limit, and is arranged with a special view to give adequate instruction to students engaged in painting figures for pottery decoration, wood drawing, and all other applications of figure work to industrial art. The students work chiefly in charcoal, and the great aim is to make rapid and effective sketches rather than laborious and highly-finished drawings. This is working in the right direction, for a good realistic effect is produced, which answers admirably for decorative purposes. Modelling occupies a large number of the students, as they are chiefly employés at the various Lambeth potteries. The class for china-painting meets twice a week, is fairly attended, and I was shown some excellent work.

Many industries, and more especially the potteries, for which Lambeth is now famous, have developed in consequence of the influence exerted by the Lambeth School of Art, of which Mr. Sparkes, now Principal of the National Art Training School at South Kensington, was formerly headmaster, and who, as treasurer at the present day, practically superintends it. This gentleman, who has, perhaps, done as much as any man living towards instructing the masses of the people in art, gave it as his opinion before the Royal Commission that instruction in art in Elementary Schools should be made by the schoolmaster himself or by his assistants; and that the art master should inspect his work, keep it on departmental lines, and that he had

had at one time some 5,000 children under inspection in the neighbourhood of Newington and Lambeth; that the method of imparting instruction was by means of the black-board. The master would draw a line which the class of children would imitate on their slates or on paper, as the case might be; that this line would then be divided into half; then a line was drawn between them at right angles; and the children always showed what they had done by reversing their slates, so that supervision was kept over them. Thus a square was produced, and the square was explained, and then was filled with any pattern that might be the result of any further subdivision. It might be simply done, or it might be a complicated figure that the teacher would explain, according to the capacity of the children. Then practical plain geometry was taught, and to the elder children drawing from objects. Mr. Sparkes' description of the development is so graphic that I must give it in his own words:—"A few months after I went to Lambeth, in 1857, I had one student from the potteries, and I asked him to make some trials for me. I went to his master, but he was averse to doing anything. I then asked this man to give me clay, and to make certain trials for me in the kiln. By scratching the clay, by painting the clay with a stopping-out mixture, and dipping it afterwards in colour, and by making use of two or three clays, I saw there were capabilities in the material, but it was not for some years after that I was introduced to Mr. Doulton, and only in 1869 that we made some serious trials to get the clay decorated. Mr. Doulton, myself, and some of the students of the school at that time made some outlines, and they were rubbed in with cobalt and flux, and put through the kiln, and the result was encouraging. Then, for the International Exhibition of 1870, we made more trials, and soon the effort became more earnest still, and three or four students—a room being given to them—went down to the pottery to manipulate the clay while it was wet from the wheel; I thought we could do more with it in that way. The result was that a great deal of attention was attracted by this attempt to decorate stoneware. Mr. Doulton was encouraged to take up the whole question, and from that time he provided rooms and a manager, and all that was necessary to carry on the manufacture on a trade basis.

Mr. Sparkes describes how the Doulton pottery developed: that, in one sense, it was a revival of the pottery made in Germany in the 15th, 16th, and 17th centuries, but that its decoration and the method of firing it are original. The designs are always original and never repeated, except when pairs of articles are made. There is no moulding, but all the articles are thrown on the wheel and treated independently as regards design. There is a strict alliance between the school of art and the pottery, and earnest influence brought to bear to urge a continuance of study. A girl has to pass her second-grade examination at an art school before she can enter the factory, and she gets additional pay for each examination she passes afterwards.

Certain classes, which originally were instituted by Mr. Sparkes, and which languished for want of a subsidy, have been taken in hand by the City and London Guilds, and, with others, worked at the technical school already described. Here they take girls, boys, men, and women, and give them special training for that industry which has been created by the Lambeth Art School. The young girls who are engaged in dotting—or the lower forms of decorating stoneware—have a special teacher of elementary design; they are taught proportion, &c., and they do this every evening alternately during the summer, while they are working at the art school at second-grade subjects. In this way a student may belong to both schools, the art school

school and the technical school. In the art school the work is done according to the regulations of the Science and Art Department, and in the technical school that class of work which is required by the manufacturers. In alluding to Mr. Hugh Stanner's class of higher design, Mr. Sparkes says this is attended by the heads of rooms at the pottery, and by artists who paint and draw on the stoneware. It is assumed that the persons entering this class can draw well and design fairly, and then the teacher tells them how to proceed. The work is arranged in this way: On one day the teacher gives a lecture, for instance on pottery and form, and shows that the form of a vase designed for certain narrow proportions will not be good if it is simply drawn out; that a mere expansion of the thing will not do it; but that if it is this particular width it must have certain other lines in order to be harmonious. In the same way he would show what a moulding is and how it should be decorated, and that is done practically, with clay mouldings, which are then drawn out, and dug out, and decorated, and hung up in proper light and shade to show the value of the work. The students are taught the value and use of mouldings. Then proportion is dealt with from the architect's point of view, and the construction of ornament is carefully worked out. And so they get completely through the subject in the course of a year. Mr. Sparkes further says that the difference between the work done at the Lambeth Art School and the average art school has been that at Lambeth there have always been life classes, designing classes, and modelling classes, three things not common in the art schools because they are costly. The distinction at present is that the City Guilds Institute has taken over the life classes, the modelling classes, and the designing classes for fuller development. They have always existed, but the art school proper is now so much the poorer by the loss of those three classes. Its work still goes on on the same lines in the morning classes, when the city guilds do not assist; in these amateurs are taught to draw and paint the figure, and are taught to design if they wish it. There is in addition to that a class which the city guilds have not yet taken over, a class of pottery-painting; it belongs to their section, but the buildings they use are not large enough for the class which is very numerous. The students of this class pay half a guinea a month, which is sufficient to pay the expenses of the class and its teachers.

Nearly all the persons engaged in the art section of the Lambeth Pottery Works are from the Lambeth School of Art. Out of 250 now engaged there are not more than ten who have been educated elsewhere, and of these ten, two have come from the Central School at South Kensington. Mr. Sparkes thinks that the natural capacity of English people in reference to decorative art is beyond that of any other people or country, as during the last century the English had Derby, Chelsea, Plymouth, Wedgwood, and many other art potteries, established and flourishing without any Government subsidy, whereas Meissen, Scores, Frankenthal, and others, did have either imperial or local subsidies. I should say that the taste shown in those works, to which I have referred in England, was at least equal to that which was shown abroad. At the end of the last century there were steel-works at Wolverhampton, at which the steel ornaments in use at the French Court were almost entirely made. Then England had certainly the greatest artists that appeared in that age throughout Europe, viz.:—Hogarth, Gainsborough, Reynolds, and many others. English engravers were far in advance of those in France and Germany of the same date. In speaking of the great advantages of South Kensington as a source of inspiration and information to designs he says that, for example, in a class of  
“throwers,”

“throwers,” men who are about to compete for the Turners’ Company’s prizes, he can take them to the Museum, having first arranged with Mr. Wallis that certain forms selected from all parts of the Museum shall be put in a case by themselves, and can say to them, “Here are certain objects offering to you typical instances of difficulty of manufacture or beauty of form,” and so use the Museum in a very practical way. That he knows nothing in any provincial centres of industry either in England or on the Continent. With reference to schools of art and night drawing classes in Paris, their relative value, compared with the instruction given in corresponding classes in England, Mr. Sparkes thinks that in Paris it is less systematic and exact, and has more reference to higher ornament and the human form than is generally practised in the English schools; and that probably the advantage is counter-balanced by a great looseness of execution and a want of system. That a boy there has to pick up his information: he has to attend for so many evenings drawing in his portfolio in his loose way, and he gets over a certain amount of ground and gets a facility of hand which our men do not. They draw with interest in their subject, but not with the care of our men, obtaining facility of hand but not exactness of drawing; and that consequently the work done in England is more systematic, sounder, and exact than that done in Paris.

Mr. William Morris is of opinion that in training a student for designing that there are two chief things that would have to be thought of in providing facilities for the necessary study. He says: However original a man may be, he cannot afford to disregard the works of art that have been produced in times past, when design was flourishing; he is bound to study old examples, but he is also bound to supplement that by a careful study of nature, because if he does not he will certainly fall into a sort of cut-and-dried conventional method of designing, which is the bane of most of these French designs that we are talking about; and the only way for a person to keep clear of that, especially one in the ordinary rank and file of designers, is to study nature along with the old examples, and to get what is good out of them without making a design, which lays itself open distinctly to a charge of plagiarism. No doubt the only help out of that is for a man to be always drawing from nature—getting the habit of knowing what beautiful forms and lines are; this is a positive necessity. Mr. Morris is further of opinion that a man going to be a professional designer must be taught to draw in a most thorough manner; and the schools of art now instituted in all the large manufacturing towns afford on the whole, the tuition necessary. With reference to the great difference of opinion that exists between the relative merits of the means of imparting instruction in art in England and France, more especially with regard to the rapidity of execution to which so much attention is paid in France, that if not carried too far execution is a good thing, for I suppose that those who regard rapidity of execution as an important thing mean that one should not expect the students to elaborate their drawings. I quite agree with that, that is to say, I think that in drawing from the round and so on, elaborate cross hatching and that sort of thing is a mistake; you want to teach form by drawing, and that while this at one time prevailed at South Kensington to an injurious extent Mr. Poynter, the late Director of Art, tried to correct the evil; he very much objected to what I should call mere mechanical finish in drawing \* \* \* Of course everyone knows that the character of the work done at the different schools depends very much upon the masters at the head of them. There is one thing which I think perhaps might be more impressed upon those masters than it is, and that is that one does not particularly want to train up the students as picture painters. There  
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are some schools where this is overdone; but that is a matter of accident owing to the master having a turn in that direction. With reference to the South Kensington Museum Mr. Morris thinks that it would be a great mistake to do anything that was really like breaking up the collection there. People who want to study the objects know that they are to be found here, and they can get at them with a certain amount of trouble. On the other hand, his experience in using the museum—and perhaps he had used it as much as any man living—is that the museum has got rather more things than it knows what to do with. He says:—"I think that to break up a museum which has once been formed is a very great mistake. The things have a certain value in a great collection which they have not in a small one; on the other hand, I do not think that a public museum need set itself to what is called collecting, or need try the sort of things that a private man with a long purse may do. Here the things are only wanted for educational purposes, and not as curiosities. You want types of good work, not a mere multiplication of articles. This typical museum in the metropolis should contain complete collections in all styles; and when an opportunity occurred of purchasing private collections, any gaps in the metropolitan collection should be filled up at the expense of the nation; but a good many things that were not wanted to fill up gaps in the metropolitan collection might be sent to the provinces. \* \* \* A museum to be of any great use to those who are studying in it as artists or as designers, must be arranged in a permanent manner, so that one can come day after day and see the same thing; so that a man who is a lecturer can take his class to the museum and give a lecture on such and such an article, or that a manufacturer can take a designer to the museum and say I want a thing done in such and such a way; therefore I think it very much better that the provinces should have their own museums; if small ones it does not matter so long as they are typical. I would not press too strongly that all specimens should be original;—a good museum might be made up mostly of copies." Mr. Morris was speaking of patterns of art workmanship in metal and wood-work, weaving, dyeing and lace-work. He said he regarded reproductions as very useful; and that when any objects were acquired by the nation for the central museum, those objects ought, where possible, as a rule to be copied, and the copies distributed among the provincial museums; in many cases they would be almost as valuable for study as the originals. He had seen reproductions made by Elkington of things at the museum very good as far as they go, but they do not quite supply the place of the originals, as pieces of execution. Mechanical reproductions of metal-work were not so good, to his mind, as good drawings would be. He attached great importance to good drawings, as the drawing is such capital education for the student. He considered lithography a most useful thing. Mr. Morris thinks that drawing should be taught more or less from drawing the human figure, because it gives a standard of correctness that nothing else can do. I should not say, however, that it was absolutely essential. There are some people who have no great turn for drawing the human figure, who would nevertheless make clever draughtsmen in drawing plant form. I think a designer should continue his general art instruction after he is employed in his trade as a designer, in night schools and so on. It is the only way in which he would keep his mind fresh upon the subjects: he would be taught there. The French innately have style, and they generally take great pains to develope it.

Mr. Mott of the firm of H. Scott, Richmond, & Co., engaged in the production of all manners of fabrics, cretonnes, chintzes, muslins, silks, tapestries, and wall-papers, thinks that not a small proportion of the designs for fabrics are purchased in London, the majority of the designs for fabrics are purchased in Paris.

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That Paris is the chief market for designs and that there are very good reasons why it should be the best market, as manufacturers of all nations go there for their designs. That it is the centre of the designing trade, and it is the natural tendency in all trades to gravitate towards some centre. Designs turned out by Frenchmen are more generally popular than the class of designs turned out by Englishmen. It is difficult to define the difference, but universally French designs are more popular, and that this is the fact of all classes of decorative designs. Mr. Mott does not think the designs are better, but they are lighter, more frivolous, and gay. English designers of the better class are rather steady going,—perhaps over studied for the general taste. That designers on the Continent do not get any special training; that designers of note employ many assistants at a cheap salary who stay long enough to pick up sufficient information to start for themselves. In his opinion designers are accidents; as a rule a man starts with a capacity for drawing, he notices things, and sees what is going on, and then he begins to design and gains experience as he goes on. If a man has good sense he will educate himself and improve himself by study; but many do not; so long as they can produce patterns and sell them they are content. It is difficult to define what are the qualifications for a successful designer. You want a man to have some knowledge of the style of particular periods, and you want him to have some taste. \* \* \* If a man has it in him he will be a designer, training or no training; if he has not got it in him no amount of teaching will put it in him. Hundreds of people can draw who cannot create, in the same way that hundreds of people can write who cannot produce a novel. The best training people can get is that which they get in business; but a good general art education is of very great use to them. The broader the education the better.

The object of the Science and Art Department is to give the students in the schools such a knowledge and practice of drawing and modelling as may afterwards be applied to the different industries to which the students belong or into which they may go; and also, which is still more important, to furnish the means of educating the country by the training of teachers at South Kensington; and aid is given to (1) elementary day schools, (2) to training colleges for the teachers in those schools, (3) to art classes carrying further elementary instruction, (4) to schools of art, and (5) to the training school for art teachers; and further, aid is given to museums and schools of art either by contributing partly to the cost of objects or by circulation.

In the elementary day schools the instruction is limited to freehand drawing from flat copies, model drawing and practical geometry, all of which are of an elementary character. The instruction is usually given by the schoolmaster.

Mr. Bowler, the assistant director for art of the Science and Art Department, advocates drawing from the flat. He says the French system of drawing in the elementary schools was less exact than in England, and attributed it to the system of drawing from the cast rather than the flat, and the use of charcoal and the stump rather than that of the blacklead pencil; that the tendency of the use of the pencil and flat examples is to exactitude, and that he was unconditionally in favour of the introduction to the study of drawing being from flat examples, and that this should continue until they had passed the second grade examination, or a four or five years' course. The second grade drawing is freehand from the flat model drawing, that is of objects as they appear to the eye, practical perspective geometrical drawing, and drawing on the black board. The teachers of the second grade are masters of the school of arts or masters holding the full D certificate of the Education Department, the drawing certificate of an elementary teacher. I may say that Mr. Bowler's opinion is not the one generally received. Mr.



Mr. Willens, the chief artist in the firm of Messrs. Elkington & Co., and who had had a considerable experience, thinks English lads quite as quick to learn any branches of art workmanship as French lads of the same age. He does not think extreme finish any good in drawing, but that young men who have had a good grounding in art always do better than those who have not; but the best results are those young men who while engaged on chasing *repoussé* or other work in the factory, attend the art classes in the evenings.

Professor Legros, of the Slade School of University College, and who was also formerly teacher of the etching class at South Kensington, a Frenchman by birth and a good teacher, thoroughly understanding any differences that may exist between the methods adopted in France and England, says that in France the students of the art schools who do not become artists become industrial designers. They know how to draw, and have a thorough instruction in art. The principal difference is that the system of teaching which holds good in England is slow, vicious, feeble, and antiquated. What takes place in the English schools is that the students are set to work to copy an apple, or a sphere, or a cone, on which they spend a year; a second year is spent in copying a bad torso; and eventually he reaches thirty years of age and he knows nothing. There may be, of course, varieties or exceptions, but this is the view of a man who looks at the system as a whole. Looking at this question from a student's point of view, a student at a Slade school has to pay nineteen guineas per annum for the instruction. What son of an artizan or poor man could obtain one of the two annual scholarships which are offered in that school? On the other hand, the schools in France are quite gratuitous. My father paid five francs, which is 4s., and that is the whole amount he paid for my instruction. I had to buy drawing materials, but my instruction only cost 4s. Gratuitous instruction, in M. Legros' opinion, has a most beneficial and marked effect upon the French, which are dependent upon art instruction, because the sons of working men can profit by it. Without this gratuitous character instruction is provided for those who do not want it. The drawing of the art schools of the Science and Art Department are defective, from being slowly done—only three or four in a year—the students having to finish up with delicate points. Mr. Poynter introduced the system of stumping, which was a great improvement. M. Legros said he was aware that certain teachers attached great importance to this highly-finished class of students' work, which he thinks enough to drive the pupils mad; he says those who spend their time that way have no head for rapid work, for when they spend a month or six weeks in shading up a sphere how is it possible to get ideas into their brains. What is wanted is to fill the mind with the appreciation of form, and this the English system does not give. Under Mr. Poynter's direction considerable alteration has been instituted, and much improvement made. M. Legros sees no difference between industrial art and pure art; therefore that pure art training ought to precede any training in the art of designing, that the best designers are those who make the best drawings or have the best knowledge of art. A man who knows how to draw well can easily apply his knowledge to industrial designing. Instruction should be the same for students who are intended to be painters as for those destined to follow industrial designing as a profession. That all the best artists of the *renaissance* were designers of furniture or for the industrial arts and manufactures. He would make designers design a fabric which should be actually carried out, or a piece of furniture that should be actually made. Students should be taught practically; *repoussé* work must be made in *repoussé*, or carving  
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in actual work. While their designs are only on paper artists are like generals who have never fought, but as long as designs are restricted to the paper nothing more can be done in training than to train in the direction of pure art, because they only prepare projects or schemes, and do not actually execute, and that has been the fault of the great English designers. Flaxman was only a designer and not an actual executor of his designs, or merely to a very small degree, and mostly in pottery. Flaxman was forced to confine himself to working for pottery and to designing work, though he was a real artist who failed to have an opportunity to carry out his work in marble. As to the difference in natural aptitude for art between French and English children, English parents think their children are born with an innate genius for landscape painting or something else, and consequently not enough attention is given to study. There is no inferiority in the capabilities of the English people in regard to the reception of art tuition; that the English youth have great natural energy and a desire to distinguish themselves. The influence of wealth must be eliminated. There is no reason why as high a stage of artistic training should not exist in England as in France, by adopting equally good methods of instruction, but the gratuitous instruction lies at the root of the whole question. The actual artistic power and excellence of the work people of England are as strong as in France. English working men are as capable as French working men. Open free adult classes, and you will prove that the English workman is as good as the French workman, and the great want is that of skilled teachers. The artist academicians do not care to teach, and the English suffer from the want of proper teaching. The national artistic power is increasing, but progress is slow, while it might be much more rapid. In speaking of art, as applied to industry and artistic productions, there has been an enormous change in the last thirty years.

M. Legros further thinks that besides the establishment of cheap or gratuitous classes there must be teachers who are exhibitors at the art exhibitions, who can, by their position, encourage the students and lead them on. The English teachers are not artists, and the artists are not teachers, whereas they ought to be blended. Museums are productive of great good, and their establishment for the collection of industrial and suggestive art would produce an enormous influence for good. These collections should be general in their nature, and not apply altogether to the special industries of the district. If it be confined to one branch, one can only choose the best thing in that one branch. The collection should be superintended by artists, and that is the reason why the collection should be of a general character. Modelling classes are of the highest importance, both in the metropolis and the provinces; and for every three men trained who turned out good artists, five would turn out to be good industrial designers. The art training, with a view to industrial designing, should always be of a general nature. At Sevres the art training is special, and given in exclusive relation to the China manufacture, but there are two classes of artists there—one the men who give the designs, and who are true artists in every sense of the word; the other, the men who are paid so much a year to transfer these designs to porcelain, in order to make presents of them. Lolor was an artist who furnished such designs, and Rodin, the eminent sculptor, was another. The highest walks of industrial art are always occupied by the true artist.

Mr. Walter Smith, who was from 1871 to 1882 Director of Art Education in the State of Massachusetts, United States of America, gave very valuable evidence as to art teaching. This gentleman's experience has been very great in the various methods

methods of teaching. In America he gained enormous experience. In speaking of this gentleman's advent, Mr. T. Edwards Clarke, the distinguished American authority, says :—In the coming of Professor Smith, the hour and the man happily met. The successful result of the efforts in Great Britain to improve the manufactures of that country, by the definite training of large numbers of youth in drawing, which had then been going on for some twenty years, was known to many citizens of Boston and its vicinity. The inferiority in artistic qualities of the products of the manufactories of New England at that time was painfully apparent to all who had an opportunity of contrasting their ugliness with the beauty of the exquisite designs shown in the products of the looms and potteries of France and England ; nor could this inferiority fail to profoundly impress all who were interested in the prosperity of American manufactures. The man who had been chosen as the one to make the experiment of introducing the study of industrial drawing in the public schools of the State, was unquestionably a man of unusual genius, possessing extraordinary powers of inspiring confidence and awakening enthusiasm. Thoroughly trained in the successful methods of the English system, and admirably endowed with natural gifts, Walter Smith was peculiarly fitted to undertake the almost Herculean task—an otherwise impossible task but for the aid of so distinguished an educator and able executive officer as was Mr. Philbrick, then City Superintendent of the schools at Boston, joined with the hearty support of Mr. Charles C. Perkins, Professor William R. Ware, and of numbers of like public spirited citizens. Professor Smith's duties were equitably divided between the City of Boston and the State. As State Director he had to visit those cities and towns which were by law compelled to introduce drawing, and by lectures and teacher's institutes to initiate the teachers in their new studies ; to visit the State Normal Schools ; to organize and set in motion the evening classes in industrial and mechanical drawing ; and, subsequently, also to organize and take charge of the Boston Normal Art School. He also prepared carefully-arranged schedules of instruction for the public schools through all grades, as well as courses of study for the evening drawing schools, and for the Normal Art School.

In his evidence Mr. Smith says of his experience in Art matters, that in the year 1848 he became a student at Somerset House, which, at that time, was the home of the School of Design, then under Mr. Redgrave, Mr. Herbert, and Mr. Townshend as the three head-masters. The National System of Education was merely a local one, and the whole organization was based upon advice given by a few artists who were not educators. "It will be within the memory of most of the members of this Commission that the English Government commissioned Mr. Dyce to make a drawing-book as the basis of art education in England, and that all the students and the future teachers were brought up upon the infant food which we obtained from Dyce's drawing-book. In 1851 the Great Exhibition—the first International Exhibition—proved one thing very decidedly, and that was that England was drifting to leeward, and losing her grip on foreign and even on home markets, through want of skill and taste in her manufactures, and that the schools of design had really very little influence upon the manufactures—they had some, but it was not very sensible. There was no art education for the masses of the people, and consequently there was no appreciative constituency for good work, even if it were produced. As a boy, I used to go through the Exhibition of 1851, and even then, being far away from my twentieth birthday, I could see how inferior English work was to French, for instance ; and it was the general and common opinion

opinion, both among students, and critics, and masters, that England was very much behind in the points in which, as a manufacturing country, she should have been foremost. You will know that this public conviction led to the establishment of South Kensington Museum, the nucleus of which I saw drawn in one waggon into Marlborough House courtyard. It started the South Kensington Museum, it started a system of public education in art for national and other day schools, and it started the training-class for art-masters which has since become the National Art Training School at South Kensington. Now, I was one of the first six students chosen out of the London School to form the nucleus of the training-class for art-masters, and therefore I was in at the birth of this Department of Science and Art, and have watched it very closely, both as a student and as an art critic, ever since; I do not think there has been a publication issued by it which I do not possess; and being a student of art history and of education, I have felt a great deal of interest in watching its development. It is necessary that I should say this in order to show you what I have to say presently is not a hastily formed opinion, or one formed on insufficient data, but that it has been arrived at deliberately by experience in the first place, and by ample opportunity for observation and study in the second place."

"In comparing the art instruction of this country with that of the State of Massachusetts, and in the other States of the American Union and Canada, both past and present, I must say the work was chiefly mine, and it was not my fault if there were so few helping hands and so many hostile ones. In the year 1870, when I was head-master of the Leeds School of Art and Science, the officials of the Science and Art Department communicated with me, and said that the State of Massachusetts wanted some one to organize a system of art study in the State and its chief city, the city of Boston, and they sent me the documents relating thereto, which were simply an application on the part of the city of Boston for a competent teacher. I think the application was made to Mr. Cole first of all, and he selected me for the work—so, at least, I was informed at the time—and after a certain amount of preliminary investigation I crossed the Atlantic, to see the land, study the institutions, and find out what they wanted, and I wished them to see whether they thought I could do what they wanted. I went and found that art education did not in reality exist. There were specifics in the shape of drawing-books, more or less quackish in their nature, and none of them bearing on education, even indirectly—neither artistic education nor industrial education; but they were made so as to give copies to children with paper to draw upon, and, I suppose, to pay their makers, both authors and publishers. This was a distinct feature in the *modus operandi*, which, I think, was of value, viz., that the examples for instruction were printed in books, so that the pupil always had his copy and his paper close together, occupying very little room, and the whole class drew together on the same pages, and from the same example at the same time. This feature of their instruction was, I think, valuable, but that was a part of the process of teaching which really had nothing to do with the character of the instruction or with the treatment of the subject. I went to Boston and the State of Massachusetts to organize something in the way of art education that should be general and practical, and not dependent upon special teachers. They were suffering there from exactly what we suffered from in England before the Normal training school was established,—all the teaching of drawing was given by special teachers, and not by regular teachers, and their special teachers were few and ignorant, and could not teach. The great work of this Science and Art

Art Department really has been to put the drawing into the hands of the regular teachers, so that it is not dependent upon accident or extraordinary outlay, or payment of extras by the parents of the pupils. I mean by a regular teacher, not a visiting teacher. I call a national schoolmaster a regular teacher. The great desideratum or need were to put the drawing into the hands of regular teachers. We began to do that here in London in 1852 or 1853, and afterwards it spread to the provinces, and finally the whole kingdom has adopted the principle. But then in America it was a matter of extras, or a speciality, a special subject taught by a visitor, and the regular teachers never took it up at all, or so seldom that we may practically say never; they considered it to be one of those things that came from outside the school-room, not from the inside. Being trained here—having taken part in the business from the first—I saw the great thing to do there, as it had been here, was to get the subject of drawing taught by the regular teachers, and until that could be done anything in the way of general success was impossible. I wanted this done in all the public schools of each class. The public schools of Massachusetts are divided generally into three grades—the primary, grammar, and high-school grades. Broadly speaking, these represent the ages of children thus:—Primary, from 5 to 8 years of age; grammar, from 8 to 13; high, from 14 to 17 or 18 years of age. Everybody pays taxes for these schools, all classes send their children to them, and you may say that the public schools of America really educate the whole of the people. Private schools are so few and insignificant that they do not count, being only for the very rich, and under no control from without. I saw that the important thing to do there was to do what had been done here, and I repeat and emphasize this, because it is a vital principle, and the keynote of all art education, nationally, viz., to get the teaching of drawing into the hands of the regular teachers, and take it out of the hands, therefore, of the special teachers, so that every child who attended school should have the opportunity of being taught to draw, and not only the opportunity, but that he should be taught in the regular process of education, without any reference to any special ability or skill on his part, or to what is sometimes called genius—that if he were taught to read he should be taught to draw, and by the same person, and in the same inevitable and regular way. That of course involved two things. It involved getting the teachers qualified to teach, and it involved taking out of the hands of the special teachers a profitable occupation in an illegitimate field, and finding them legitimate employment in special schools. The accomplishment of these results has been a very long process, but one which has, I think, somewhat justified the patience and hard work that has been put into it. I propose to show you some of the results of the instruction, in the form of exercises by the pupils under the instruction of both special and regular teachers, to justify what I have said about the results. I went to work in America with the training that I had, and began, I think, three days after I landed, teaching the teachers of Boston, giving them, in one of the large schools, regular lessons in the ordinary subjects of elementary drawing and instruction, freehand drawing, model and object drawing, as I had been taught it. So, by degrees, getting a corps of regular and special teachers and educating them, I was enabled, by their co-operation and training, to spread this work in the State of Massachusetts to begin with, and finally over the whole of the United States, and Canada as well. We went upon the plan which we had introduced here, a *wrong one I think now*, but we worked according to the light I then had, and we taught those elementary subjects

subjects—freehand, model, and object drawing—at first to all the teachers, and then after they had studied and practised them sufficiently they passed an examination in them, and were certificated to teach. They reproduced every lesson which I prepared for the course of instruction, and every design which I made, in their own class-rooms, so that if I designed an example for instruction, say, on the Monday of one week, and it was given to them on the Tuesday, the day following, before the Saturday every child in Boston would have made a copy of it, or studied that subject which I had designed in, so that I thus reached into every class-room and to every child in the city by those means. There are 1,200 teachers in the city, and they came once a week to receive lessons; and what I designed and what I prepared, and gave to the special teachers of drawing, the special teachers of drawing, with myself, gave to the whole of the teachers, and the teachers to their pupils, and thus we reached every child in Boston through their teachers. The instruction was given to female as well as male teachers; they make no distinction in the United States. They do not recognize sex in education, either in pupils or teachers. Nine out of ten teachers are ladies. Then, after the first preliminary work had been done by the teachers during one year, we took up other subjects of study the next year, such as geometrical drawing, perspective drawing, and a subject, I think, peculiar to the country, and that is design (elementary and applied) in day schools. I believe that I am right in saying that we commenced the teaching of the subject of design to every child in the public schools for the first time in the world—that was in the city of Boston. Elementary design had been taught as one of the subjects of study in art schools by the Science and Art Department, but it has been taught by us to adults or youths in technical schools, such as schools of design. I am not aware that it has ever been taught as a subject of study in the public schools of England, national schools, board schools, sectarian schools, and others \* \* We began to teach the subject of design to every child, and that was a very important movement, because you see it involved the belief that every child had the power to design, which is in theory somewhat new, and therefore to some extent was an experiment, and the theory was very much questioned by a large number of people, and ridiculed by a few. Nevertheless, we went to work and did the deed, and left the doubters to doubt and keep on saying that it was impossible after it had been already accomplished—a way those people who talk but do not work have with them,—whilst others looked on and wondered. This was in the autumn of 1873, or the beginning of 1874. It followed up, you see, from the preparation made by freehand drawing and object drawing in the first years. Then we came to geometrical drawing and perspective drawing and design; we got our materials and training in the other elementary subjects, and we then employed them in the practice of design. The whole thing was based upon one very striking thing; it was based upon faith. I had faith in human nature. I believed we were all of us endowed with great faculties in one way or another, and that if we did not develop them it was because we had not opportunity, and this being my faith, and having tried many experiments to ascertain this fact in this country, I discovered the truth of several things which seemed to be questioned by many persons. I discovered, for instance, that every one could learn to draw, and that every one could learn to design, as the word (and the process of) design should be interpreted, viz., not *originating* things, but *arranging* things; and having this opportunity on a still broader scale in the United States, I went to work grounded and founded upon this faith I had in human nature, and supposed that if one person could design all persons

persons could design—with different degrees of success in this as in all things—if they had the opportunity ; and therefore I proposed that we should teach the subject of design, properly interpreted, the arranging of natural forms or details of historical ornament in new combinations, to all children. It was a startling proposition, and very difficult to carry out, because so few people had faith. Then those five subjects, viz., freehand drawing, model drawing, geometry, perspective, and design having been taught to the teachers, they carried them out in the public schools as well as they could, and the special teachers were withdrawn from the lower grades of schools at once, and the regular teachers did the work. We began, as I said, upon the basis of what was done in England, but we introduced several things into our work which were not copied from England in any way ; in fact, I think I may say that they were purely of American origin, only that they came from an Englishman. The great principle was that we taught original design in the lower grades of schools in the form of what is called elementary designing ; in the higher grades, the high schools, we taught applied design. Thus, in the lower grades, the primary and grammar schools, we simply taught the arrangement of natural forms and of conventional ornament in regular geometrical shapes. First, in the primary schools as an amusement, and then in grammar schools, in order to get proportion and balance, and an inkling of the principles of design ; and then having taught that in the higher schools, such as the high schools and evening schools, we taught applied design, that is, design applied to the ornamentation and decoration of some useful object. When the work was begun it was begun as an exercise in arranging, and was afterwards carried on as an exercise in decorating or ornamenting some object of use which was capable of being manufactured. I think I can show you that my faith was perfectly legitimate and justified in the work which has been produced, not by a few picked students, but by 100 per cent. of all the students. We also introduced two other subjects or branches of drawing—one called drawing from dictation, the pupil drawing without a copy from the oral description of the teacher, first regular forms, and afterwards irregular forms, or an effect of light and shade, or an effect of colour. Drawing from dictation is a branch of drawing that I hardly think is practised in England now ; and another branch which is of equal importance we made a regular subject of study, viz., memory drawing, the drawing from memory of everything that had been previously drawn, to begin with ; and then the drawing from memory of things which had not been previously drawn, but had only been seen by the eye. Pupils in the day schools do not practise this, though I know that school-teachers are examined for it in their certificates. So we introduced three original branches : Drawing from dictation, design—that is, we applied it in the day schools—and memory drawing. Now, that has been going on in the city of Boston, and through the Normal school, which has had from 300 to 400 students in it every year since 1873. This school, of which I was Principal, was established for me by the Legislature of Massachusetts in 1873, and through the instruction given in it this work has nearly spread over the whole of the United States. I think I may say that the work originated first of all partly in South Kensington, and then was developed further in Boston, and that that was the commencement of the crusade in the States and Canada, for the same may be said of Canada. I was told a few weeks before I recently left the United States that there were from six to eight millions of children being taught to draw from designs which I had made ; so that you see the drawing is becoming very general, and the value of our experience in the new countries

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is that drawing has been put on the right basis; it has not been made a speciality, but destroyed as one. We had first to assume that every child could learn, and that every teacher could teach, and that makes the plan very practicable, and reduces the expense. The hours devoted to drawing in the public schools in the city of Boston are as follows:—In primary schools for children of from 5 to 8 years of age they give two hours a week in four lessons, drawing on slates or in book, taught by the regular teachers. In Grammar Schools, where the pupils are from 8 to 14, they give one and a half hours per week, in three lessons of thirty minutes, or two of forty-five minutes duration, drawing in text-book, and taught by the regular teachers. From the age of 14 to 18, in the Latin and High Schools, they give two hours a week, in two lessons of sixty minutes each, taught also by the regular teachers, except the first class or seniors, who are taught by special teachers. My object was to abolish special teachers in elementary schools, and we have cleared them out of the city of Boston from all elementary day-schools. There is not a special master teaching drawing in the public day-schools in the city of Boston, not even in the high schools and classes. That is what I went to do, to destroy the specialism in drawing, and to make it an elementary subject of instruction, and I have done it."

Evening classes were established in 1870, by the same Act of the Legislature of Massachusetts, which required drawing to be taught in the day-schools, and these were free. "My first work in connection with them was to visit them, or persuade the localities to establish them, and to find teachers for them. There was exactly the same difficulty there as here. When the schools of design were established here, the trouble was to find masters, and we could do nothing seriously in the way of art education until the normal school had been established, except to establish classes or schools and see them fail, and see people get disgusted; but, finally, after the Massachusetts Normal Art School was established in America, and when I could get trained teachers, we managed to get something like a scheme or system, and men and women to work it. I have very little to say about the evening schools, because they have been the most unsatisfactory part of my labours there, on account of the difficulty of getting teachers of any experience or ability to carry on the work. There is really nothing serious going on in many of the evening classes; and I do not suppose there will be until the students trained in that normal school of Massachusetts, or elsewhere, are matured, and have got their experience in education from the public schools first, and onwards and upwards."

Professor Smith found in the United States entirely an open field. He saw there were millions of children to teach, but comparatively no teachers, consequently the first thing to be done was to provide teaching material. His experience in England had taught him that to obtain these a normal school was necessary. While many educators in the United States, such as W. B. Fowle, the Hon. Henry Barnard, Rembrandt Peale, and others, had strongly advocated that drawing should be a class subject in all State Schools, nothing was really done until Professor Smith took the matter in hand. Thinking people had seen the advantages resulting from instruction in industrial and mechanical drawing, and were anxious that no further time should be lost. From the want of skilled workmen with a knowledge of drawing and designing, that manufactures competed under disadvantages with the manufacturers of Europe, that workmen of this class were not taught in the United States, but were imported from Europe. They had also seen the change effected in England by the institution of Schools of Art, that boys and girls could readily acquire

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considerable skill in drawing by the time they had to leave the school. Men of all classes became so deeply impressed with the importance of the subject, that an agitation was commenced and the State Legislature resolved that the Board of Education be directed to consider the expediency of making provision by law for giving free instruction to men, women, and children in mechanical drawing, either in existing schools, or in those to be established for that purpose. To this the Board replied that as every branch of manufactures in which the citizens are engaged requires, in the details of the processes connected with it, some knowledge of drawing and other arts of design, had no doubt but that the greatest good would be accomplished by proper instruction in the public schools, and that great efforts should be directed towards this end. Teachers should be required to be qualified to instruct in freehand drawing, and the work should be began in the primary departments and continued with zeal and fidelity through the period of school life. The Board recommended (1) that an enactment requiring elementary and freehand drawing to be taught in all the public schools of every grade in the commonwealth, and which shall further require all cities and towns having more than 10,000 inhabitants to make provision for giving annually free instruction in industrial or mechanical drawing to men, women, and children, in such a manner as the Board of Education shall provide. (2) A resolve to authorize the printing in pamphlet form, under the supervision of the Board of Education, of the communications above-mentioned on the subject of drawing, or of such portions of them as may be deemed advisable for the use of the Legislature and for distribution by the Board of Education. This referred to reports furnished by educators and competent men of all classes, whose opinion had been asked upon the subject by the Board, of which the following extract from a letter of the Rev. Charles Sewall is a sample. He says:—"Of the importance and utility of such a measure I entertain no doubt. I have long been questioning others and considering myself how this might best be done in the schools of this town. I have observed here many instances of peculiar aptitude for sketching and drawing upon the black-board. Quite young children sketch capital representations of animals, houses, steam-cars, &c. Older children draw very correct maps with great facility, indicating a power which rightly directed, and a taste which properly cultivated, might lead to acquisition of great practical benefit in after-life. The important art of penmanship appears to be most easily acquired by the same class of scholars. And the possession of facility and excellence in both of these arts will prove an advantage in after life for which much that is now acquired in common school education will be no equivalent."

The Act was passed and Mr. Walter Smith was brought from England in the manner I have mentioned. He found the ground cleared of all obstacles, and immediately set to work in the right direction. His distinguished ability as a teacher and acquaintance with the English and European systems of art instruction had shown him, that in a country unhampered by established opinions and red-tapeism, and where every one was eager to put his shoulder to the wheel to assist in the great work, that here was an opportunity of constructing a comprehensive system. Adapting all that was good of the old methods to the requirements of the new country, and, on the contrary, omitting all that was bad. Mr. Smith's object was to recognize all the good features in the systems of the older nations of western Europe, where the subject was not a new one, and adopt them to American circumstances and requirements, thus to establish a sound system of art education. He began at the right end, and made the state school-teacher the art instructor. This was a grand initiation.

initiation. It laid a broad foundation for art culture by universal instruction in elementary drawing, and provided instruction in the higher stages of art by means of art schools and special drawing classes. All this work was followed by complete success. Pupils flocked to the classes from their industrial occupations eager to learn and sanguine of success, and at the time of the Centennial International Exhibition, some five years later, absolute proof was shown, in the work of Mr. Smith's pupils, that a complete revolution had been effected, and that by a most gigantic effort the people of the United States had sprung forward, and under the direction of their enthusiastic art director had not only recovered their lost ground, but were fast coming to the front in matters pertaining to elegant and artistic design.

Feeling the absolute necessity for a Normal School of Art, Professor Smith never ceased to advocate its institution. He invariably recognised that the only real difficulties in the way of success in art instruction are the want of good examples with which to give instruction, and the want of teachers with sufficient acquirements to teach the subjects coming under the description of industrial drawing. He set himself energetically to work to overcome these difficulties. He taught himself the necessity of doing the work at home. The cost, delay, and risk of getting models, altogether disproportionate to their value, were so great that he induced American manufacturers to produce such examples as were required, and so obtained them at first cost. He taught indefatigably, never losing an opportunity to address and advise the public school teacher. He says, "In my addresses and lessons given to teachers I have endeavoured to inspire them with a confidence in their own abilities to teach drawing, which is not commonly felt, and to point out the simplest way of giving instruction to young children: also to impress upon them the need of varying the character of the lessons as much as possible."

The State Normal Art School was founded in 1873, the second year of Professor Smith's art directorship. He was at once placed at the head of the new institution as director of the school, and by his advice a very able staff of instructors was secured. He had secured the provision for the proper training of teachers which he had so earnestly desired, by which the ultimate success of his system was assured.

I cannot praise too strongly this courage, energy, and persistence of the American people and their art director. They grappled determinedly with the ignorance existing throughout the length and breadth of their land. Statesmen, educators, art masters, men, women, and children, all strenuously took up arms against the prevailing ignorance, and honestly determining to succeed, accomplished it.

In the Director's report for 1875 it states how much difficulty was experienced in qualifying the regular teachers to impart art instruction; but at that period, two years after the Normal Art School, had been opened, the difficulty had disappeared, and qualified teachers could readily be obtained. That the only way in which industrial art education can become general, and its influence extend to the final object contemplated, is by the teaching of drawing to every child in the day schools. The evening drawing schools will do little good until the pupils approach them prepared by their practice in the day schools, and the only means by which public taste can be improved is by cultivating a perception and love of the beautiful in the mind and heart of every child by means of drawing.

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"The drawing as taught in the schools should be essentially a preparation for the understanding and practice of industrial art—the first kind of art practised by all nations. The instruction should comprise both instrumental and freehand drawing; the first to cultivate a love for and habits of accuracy, the second to develop power and skill in the observation and expression of the inexact. One is not more important than the other, but either alone is a very helpless accomplishment, whilst the boy or the man who can handle pencil and compasses with equal facility is independent of either, and master of the situation, whatever may be required of him in industrial art."

He goes on to give the subjects which, in his opinion, are required to be taught in elementary schools:—1. Geometric forms and definitions; 2. Practice in drawing, from flat copies and the blackboard, of simple objects and ornamental details; 3. Elementary design, *i.e.*, exercises in filling simple geometric forms, such as the square, triangle, circle, or hexagon, with short lines, curved and straight, arranged symmetrically, as practised in the Kindergarten schools; 4. Drawing from dictation of exact forms in defined positions; 5. Drawing from memory of previously drawn exercises; 6. Learning the names, though not drawing the forms, of geometric solids. And here it might be well to observe that it is not the manual skill displayed in the children's drawings which determines their educational value, so much as the thoughts they have induced, and the habits of accuracy, observation, and self-reliance they have helped to create.

1. In primary and secondary schools, the pupils should be taught the use of the ruler and compasses in working out plain geometrical problems and in executing the mechanical repetitions of the elementary designs.
2. Design as practised in the workshops should be taught in the schools, and in the grammar schools, the first features of applied design, *viz.*, the invention or adaptation of the forms of nature or historical ornament and their exact repetition as required in design. This has been proved to have been easy of attainment.
3. Object drawing, from the copy to learn principles, and from the object itself to learn their application in drawing from nature, is a very important branch of grammar school work.
4. Enlarging and reducing from flat examples of natural forms or historical details of ornament, are necessary for practice to give knowledge of proportion and of accepted types of the beautiful in design and ornament.
5. Drawing from memory, of forms already drawn, is a very direct mode of fixing in the mind the essential characteristics of any form, and is an exercise which should form a part of any system of instruction in drawing.
6. In every class the imagination of the pupils should be exercised by drawing from the teacher's dictation such forms as can be exactly described, as, for instance, geometric patterns varied by other forms, such as leaves and flowers described by their names, or details of ornament previously drawn, and whose names recall their shapes and characteristics. Thus by regular alteration of exercises, the thinking, inquiring, executing faculties of the pupils will be aroused and exercised, and in one direction the senses of sight and touch will be utilized for the purpose of acquiring information and of creating or developing habits of accurate observation and fructifying incipient taste.

Mr.

Mr. Smith says, "I have always considered that the work of drawing in primary schools was to learn names and interest the scholars; in grammar schools to apply those names, and utilize this interest in practising the branches of drawing, whose names and first principles have been learnt in the primary schools; whilst in the high schools the processes of drawing should be applied to some useful branch of industrial art, so that the pupil may realize that drawing is not an amusement, but a help towards the serious work of life,—a practical help, either to the active agencies which minister to the progress of society, or a practical preparation for the incidental duties which all will be called upon to perform, though it may be in a variety of ways. In the high schools the pupils are old enough to be taught special subjects in drawing, but it is apparent too often the case that they are ignorant of the elements of drawing, and are therefore unable to take up the advanced subjects. This will be remedied when the children who have been well taught in the classes below take their places in the high schools, and we shall not see how very general is the ability to draw, or how the practice improves the taste, until a younger generation than the present become high school scholars."

Professor Smith, when asked by the Royal Commission whether his experience in America led him to the suggestion of any improvement which the Art Department of South Kensington might introduce or foster in our English schools, replied that he has serious ones, and as a patriotic Englishman, desired to make them. He said "he thought they began in England upon a wrong basis—a very unphilosophical principle—and that they had been misled entirely by choosing that wrong principle. He had been misled himself, and until recently had made as many mistakes as anybody. He had only reproduced in his public work and teaching that which he had been taught, and there was not in his opinion one man who could be described as a thinker, or even as a great teacher amongst all the men who started the schools of design. He did not think a single man amongst them would ever live in history as an educator. "We began wrong," he said; "we began by trying to teach people to draw the outline, for instance, of an object, which is the last thing the eye sees; we began to teach pupils to draw precisely that which does not exist, and that is the outline, and we have kept at it ever since. Herbert Spencer has got a little towards the right idea, when he says that every child should begin the study of drawing with a colour box, and copy what the eye first sees when it looks at anything, and that is the colour; and then he should get towards roundness and projection, as expressed by light and shade, and finally it will be found that the object will have an outline if its colour and roundness be expressed or aimed at. We began utterly wrong in England, and we have gone on wrongly, and the consequence is that it is only the exceptional person who learns to draw very well. Now, in my experiments, I have reversed that process, and I find that not only does every person when he is taught rationally and intelligently in the same way that he is taught Latin and Greek, and mathematics, learn to draw well, but also to paint well and design well. But it is on a totally different principle from that on which he is taught here in England. I do consider that in the Normal School of Massachusetts, and more thoroughly in the Conservatory School of Fine Arts in Boston,—of which I am now the principal,—we have developed an intellectual method of teaching drawing,—more industrial, more practical, more artistic, and infinitely more successful than anything that I have seen in England; and I propose to show it at this new college of Bradford.

I propose to show how art education can be as sensibly treated as Latin and mathematics. \* \* \* There can be great change on the old lines by which greater encouragement can be given to the art of designing as applied to industrial purposes. The thing that is really wanted is to organize the whole scheme of instruction *ab ovo*, and to begin with faith, the faith that is said to remove mountains, and to suppose and believe that every human being is fairly treated by the Almighty, and has the faculty of design in him or her, and to teach it from the first day of school life to the last, as a precious inheritance. It is no use catching your bird old and wild, in a matter of this kind; it must be caught in the egg or in the nest. I consider that what we have done in the United States has been the result of faith and knowledge of human nature, that people could design if they chose and wanted to do so, and we have taught them from the age of five, and the Kindergarten people have taught them in their way before the age of five, and the result has been that every person has learned a little, and the door has been opened wide for genius to walk through, and we never missed a genius in that way. If we teach 100 per cent. of the children, and one out of 10,000 is a genius, we are sure to catch our genius as well as to educate the mass of the people, whilst the instruction of the mass of the people makes them intelligent and appreciative constituencies for the genius. \* \* \* It is not that in England we have been going wholly in the wrong direction without very much thinking about it, and that there has been a fatal defect; in that we have supposed designers were geniuses, and that they could not be produced by education, and therefore we have neglected to teach design until people were too old to learn it. It is not the reversing of the direction that is needed, but the underpinning of the whole fabric by a little more of the philosophy of education. It means this, that we have been working at random, first in night classes, and then a little in day classes, and there is no thorough organization, as of a tree from the root to the flower; no connection between one part and another, as there should be, in a great national scheme. This is the way in which I understand it, after seeing and working out a more practical and successful scheme in America. So far as the technical power to draw well is concerned, I think my system is satisfactory. To draw well and to think well; the drawing well is not, in my opinion, a very important thing, more than as an exhibition of intelligence. People have a false idea that a drawing or a painting is the result of a great deal of labour and work. It really is not, it is only the result of what an intelligent person of taste knows and can express. A good drawing is not made by accident; it is the representative of the intelligence of the person who makes it, and if that person's intelligence is in a very low condition the work will be low, and the process of education is to clear up the thinking power, so that if a human creature wants to make a drawing, he shall make it from something he knows and understands, an intelligent drawing. If the drawing be bad it does not distress me, as it shows me the student has failed in some part of his mental dynamics—his process of thinking—and I go to work to explain the process by which the wrong drawing could be made right, truthful, and by which a beautiful result would ensue. In education it does not matter whether the drawing is good or bad, because the process going on is the improvement of the thinking powers of the pupil, the wrong drawing is the system of a complaint, ignorance, which the teacher has to eradicate. The manipulation, the handling of any process in art, comes as of necessity, from right thinking, and from nothing else. It may be a trick, but then it is contemptible only. Improvement comes with time, and then no students should ever make finished drawings, they immediately

immediately frame them, and fall down and worship them, and then their progress is at an end in idolatrous imbecility. The results, when instruction is given to all, generally accord with those obtained in other branches of education, and the pupils proficient in other subjects are also proficient in drawing. The teaching of drawing is of great collateral advantage in other subjects of education. It develops the intelligence and the power of observation, and such a process as I have called dictation drawing, for example, is the most educational subject taught in a public school, because it involves the habit of the correct use of language by the teacher, and the closest attention on the part of the pupil. If a word is left out by the teacher in giving the lesson to the pupils, it is shown in the drawing; if a student misses a word it is seen in the drawing, for he has left a line out, or placed it wrongly, and you see he was not attending when that feature was described. It involves on the part of the teacher a correct and clear, and even economic use of language, and it involves on the part of the student the habit of patient attention, and in that alone it is of great advantage to education. But drawing is of great advantage also in other branches, such as the cultivation of taste, the opening of the eyes to see the beauties of nature, and this very irritating process of teaching design, exciting the faculty of originality at an early age, entirely irrespective of whether the work is good or bad, is emphatically education or leading out. The point is, here is a human faculty, one of the most beautiful of all, usually left to run to waste in most people, unless you begin at an early age to exercise it gently, and thus put it in operation. So that I think drawing and designing may be said to be a valuable training, in what it is, and in what it influences. \* \* \* No good results can be got from the teaching of special teachers in the general elementary day schools; not only is the teaching by ordinary teachers the best way, but it is the only way. A special teacher going into a school does this harm, that the children think that the subject must be difficult, or their own teacher would surely be intelligent enough to learn it, and then they draw their inferences and get frightened. Then the special teacher overbears the pupils as a rule; he is a specialist, often without sympathy with children, and then he fires above their heads. He goes away when the hour or more is over and the lesson is done, but he has not applied it to individuals; he does not know the class separately as individuals. It is like preaching from the top of a cathedral to the multitude below: the few only hear, and fewer, and still fewer appreciate. On the other hand, the regular teacher knowing every individual in the class would adapt the general instruction to the individual needs of the pupils, and all of them would make great progress.

"Art education in England has never yet been organized. I think, to begin with, we want to have the subject brought down to the present day. It has been carried on now for a great number of years without any, or with very little alteration or improvement, and without taking advantage of the experience of people in other parts of the world, so that it has become antiquated or fossilized. There is no new subject being taught, and no improvement, or very little improvement, in methods of teaching. Whilst we have been teaching these new things in the States and have secured that wonderful transformation in the taste of the country which has taken place there, education has found no development in England to compare with, or to be equal to it. It is the same old jog-trot thing here that it has been for a long time past, and very little result is produced. There has not been organization from the seed to the flower; there has not been sufficiently experienced direction of the whole thing from professional people, whose business it has been all their lives, and  
who

who ought to be made responsible to the country for seeing that it does not get behind as a country. I think that that is where the evil is; the system and methods are hide-bound and aimless and drifting. The children in the States draw according to the school; the method I have gone to work on has been to practise in every medium, irrespective of surface or vehicle—to draw in pen and ink, in charcoal or in water-colour, to paint in oil, and to model in clay, and to do everything irrespective of the vehicle, and attending only to the subject, not the process. If you ask me in what way do the children in the primary schools draw, my answer is that for the first year and a half they draw on slates, and for the second year and a half on paper in little books. Then when you come to the grammar schools, they draw also in books, and in high schools they draw on loose sheets of paper and in books, and all of them draw all the time on a large scale—a colossal scale—on the black-board with chalk; one-third of the class invariably draws a full-sized object, or an object larger than nature, sometimes a yard long, or high; sometimes they are obliged to have seats to stand upon to reach the upper parts of their cartoons, so that from the very first, they get practice in drawing on a bold scale, and thus express all their ignorance. They are not always copying from bold examples while doing this; sometimes from bold examples, sometimes they draw from the imagination, and sometimes from little cards that are handed round—animals and leaves, and the whole practice all the time is very interesting. They, of course, sometimes make caricatures, but they are not much worse than those that some academicians make and exhibit, and the children do not exhibit theirs, but they are interested and therefore happy, and learn the nature of things. Of course, when they draw a waggon and horses, their horses will all have a strong family likeness and strike the same attitudes, and the children will sometimes make the horses larger than the waggon; but they are kept working in an interesting way, and exhibiting their mistakes and their misconceptions so that the teacher can correct them in a general way; and then when they get to an advanced stage they draw in oil or water-colour or charcoal on a scale which gives them the opportunity of showing all their knowledge as well as all their ignorance. My way of teaching is to execute the example in the presence of the class, whether elementary or advanced, drawing from the living model in oil or in water-colour or in charcoal. My pupils have lessons four times in the week, from two till four in the afternoon. On Monday we will say they draw in charcoal from perhaps a cast; on Tuesday they draw in water-colour from a natural object; then on Thursday they will paint in oil, and on Friday they will model in clay from the living model, and then perhaps the next week we shall vary the practice by having pen-and-ink drawings, and so on.” When asked at what age they model from the living subject, Mr. Smith said “the minimum at the Conservatory School at Boston is fifteen, but that that was a professional school; but more particularly with regard to the training of very young children I say exactly the same to them as to others, modelling in sand and clay should begin with school life. I find, for instance, that if children are allowed to make a map in sand or clay they never forget the geography of the district represented. I go down into a school where they have little tables and sand, and I say to them, now each of you make a little model of the geography of your road from your homes to this building, and show how it goes up and down, and where the houses are situated. They can do that either in sand or clay. Or, if I take a bunch of beautiful leaves into a school and explain to the children their form and construction, and give the common name, and describe their capacity for design, and where they are found in nature, and how people have used them to ornament their buildings



buildings and vases, or what not; I find I can say to the children, now suppose we make a little model of one leaf, and I break up my handful of leaves and distribute it round, and set these children to work modelling leaves they do not want much threshing to make them work. They feel so intensely interested in doing something from nature, that there is no watching required, and there is not much waiting either. I have no means of comparison of the development of modelling with other than the branches of drawing and painting. I do not know whether a child would get on faster with his arithmetic than he does with his modelling. I know if it makes a modelled map it must have a better knowledge of geography than it would have without it; but I do not know whether it gets on faster with modelling than with other subjects I have never taught. I do find that when the subjects of drawing, modelling, and design are properly taught, and this abominable thing called finish is ignored, and when pupils are not allowed to finish things, but are required to make a great effort to show all their intelligence in various mediums, including clay, the whole subject of form and colour is studied in a way to make it perfectly delightful, and that this study very much develops the intelligence of the pupil, and no one finds any difficulty in learning. I do not mean that modelling should be made a too important or prominent subject, or should take up too much time, but it should be begun at the first and continued to the last, so that people should be introduced to the fact by modelling, on the one hand, and to its appearance by drawing, on the other. A drawing or painting or a design are all more or less imitations of the fact, whereas modelling introduces you to the fact itself, and you learn things about it which you never would learn from drawing imitations or copies of it. In my profession of a sculptor, if I model a portrait bust of a man I make a dozen views of his face, but if I make a painting of him I make only one view of his face. The study of a fact, as a fact, appeals to certain parts of our intelligence that the study of the fact through its appearance does not appeal to."

As to Professor Smith's predilection for the regular teacher, he was asked by one of the Commissioners whether it was not paradoxical that the regular teacher, whose knowledge of art was so much less than the Professor's, should obtain results equally good if not better. He said "it resulted from one of the first principles of education, viz., that there should be frequent and patient repetition, and that the information should be given in a simple form—in a way in which it will be easily understood by the pupil and often repeated, until the right impression is made; and I have come to that conclusion, not as the result of a desire to establish a theory, but from a close and long observation of the facts. The facts are as I have stated; and these works demonstrate that a specialist does not obtain as good as those of the generalist or regular teacher when teaching the same pupils under the same circumstances. Those are the facts. Now, my explanation of them is that the regular teacher administers instruction in small doses frequently, and adapts it to the individual needs and educational digestions of individuals, and, therefore, by careful watching, gets better results than the specialist, who comes only occasionally into the school, does not adapt his instruction to individuals, fires over the heads of most of the pupils, cares less for them individually, knows less about them, and really administers this educational food in a way in which it cannot be digested and assimilated by the mass of the scholars; that is my explanation. Inasmuch as the facts are so definite, and are established beyond all controversy, and, further, are so unassailable, and clearly demonstrated by the drawings I have shown you. Now, coming to the more advanced schools, in the more advanced classes, I have



endeavoured to make somewhat of a revolution in the teaching of drawing and in art education, by going exactly to the opposite end to that from which we started in England. We began in England with Dyce and outline. I begin with colours and light and shade from objects; and perhaps the greatest and most distinct feature of the method or system, or whatever you may like to call it, that I have developed, is, that we abolish flat copies. We go to nature or we go to the cast; we copy a well-chosen piece of antique statuary or a detail of nature; or we study from the human figure, or the living animal, or from a bunch of flowers or an object; and from the first lesson to the last we make no use of flat copies, except as illustrations. And the teachers under me have this instruction: You have to give a course of lessons in artistic botany, in anatomy, in architecture, or in engineering drawing, and you can draw what you choose on the black-board, the pupils will follow you wherever you like; but you are never to require them to do anything you do not do yourself before their eyes, so that you may get rid of the mystery. So, in taking up the study of colour, I say, for instance, the subject for to-day will be a Savoy cabbage, to-morrow a live lobster, perhaps the next day a huge piece of broken ice or a piece of drapery. Now, the teacher teaching that subject to the class has had, before the class comes in, to make a study of it, so as to show the class, before they begin, the right way of doing it. Then the subject is put before them on a platform in a room of the lecture-theatre shape. Every one has room and space and materials, and the teacher (generally a lady), taking her place before the object, begins a vast cartoon of it, and makes a powerful effective sketch of the subject before the whole class. She gets one view, and they all get different views; but this is in order, every now and then, to show them the best process and the best methods. Now, I give you an illustration. Suppose on the Monday, from 2 till 4, the subject is a sketch in oil. The teacher has a large ball put up, and that ball is copied by all the students on smaller sheets of paper; and at the end of the time these are collected and taken away and pinned up in my office. Then on the Tuesday, we will say, it is a charcoal subject that afternoon; this is a little bit larger, we make them smaller to begin with, but afterwards we have them life-size. On Tuesday afternoon, say, there is another subject taken, like this bit of the human figure, and this is to be executed in charcoal. Then that is fixed or set up, and the sketches are taken into my office and pinned up, so that I can look at them, and during the week I judge and arrange them. Then the next subject is a water-colour sketch. On the Friday it will be a model in clay or a pen and ink sketching, or something of that sort. At the end of the week, on Friday, I examine the whole of these works, and mark them, and percentage them. There is no signature on them, no mark at all by which I can identify them as the work of any particular student. They are simply brought to me to judge and examine them and classify them; and they are arranged in the order from 100 to 0 in the lecture-room. Then on the Friday afternoon the whole of the scholars come into the lecture-room, and I criticise the whole of these exercises, and tell them why one is good and another is bad. I judge them, being absolutely ignorant of the person who made them. This is how the work is carried on in the normal art school, in the second year of training. I must tell you that quite as good work, nay, I believe better work, has been done in the high-schools. This abolishes all fear of not making a nice thing. I say, make these things as badly as you like, it will not distress me. You will find it better to make them nice, as a matter of fact; but all I want to know is this,—do you see colour? do you see light and shade? As to matter of outline the students sometimes dab a bit of colour here and there. We have forty school weeks in the year, four

afternoons

afternoons in a week, that is 160 in the year. At the end of the year, besides having done all the work in the mornings from 9 a.m. until 1 p.m., every student has drawn 160 drawings. They begin with the ear and then end with a life-sized bust in the same time. Some of the things done in two hours at the examinations are perfectly startling in their power and beauty."

I look upon Mr. Sparkes and Mr. Smith the men of all others in England who have given the teaching of drawing that comprehensive consideration which it deserves. Further, they are both *facile princeps* as teachers, good artists, and heads of training colleges or normal art schools. In all the countries I have visited—and in everyone, without exception, the most extraordinary efforts are being made for the advancement and perfection of instruction in art—I have found no men so thoroughly conversant with the subject they have made their special study, and I have extracted so much of their evidence as will directly show what these distinguished men think should be done for the advancement of this class of instruction, which is, and always will be, the foundation of nearly all the technical knowledge required in industrial occupations, and which exercises so much influence for good in that education, having for its object the provision for gaining a livelihood.

I devoted the greatest attention to this part of my inquiry, and have been, through the instrumentality of the Imperial Foreign Office, placed in communication with the most distinguished teachers and educators of western Europe. I shall place the opinions and methods of these gentlemen before your Excellency, so that the authorities may have full information not only as to the class of work accomplished but the method of its production. In France, Germany, and Belgium art instruction is far more general and thorough than in England; and probably this is the case because these countries have been much longer in the field, and in which instruction has been given in the elementary schools. The practice of the Science and Art Department of payment by results has in the past, and must in the future, act as a powerful deterrent. I shall again refer to this subject after having reported generally upon technical instruction.

France has made, since 1878, a great change in teaching drawing. This national work was undertaken by M. Bardoux, and followed up by Messieurs Turquet and Proust, under the direction of the most eminent men distinguished by their knowledge of teaching. All the lyceums and colleges are furnished with experienced professors of drawing; and there is no town of importance without its school of art, and, in a very short space of time, the normal schools of art teachers, both male and female, will be in a position to furnish special professors for instructions both primary and secondary. This cannot fail to bring forth excellent results, as teachers will be taught to teach in the most effective manner from having been taught themselves how to impart knowledge. This change has necessitated another, viz.: the reform of special professional teaching. In nearly all European countries, workshops are attached to the schools of art, in which pupils are taught, practically, to make use of the theoretic instruction they have received. The city of Paris has organized professional schools and schools for apprentices from which foremen in the decorative and other arts can be recruited; and this is found insufficient. It is in contemplation to establish these professional schools at all the schools organized by the state throughout France.

In every European country there is a thorough agitation in the world of art. It is absolutely necessary in order to keep *au courant*, that the deepest and most profound

profound attention should be paid, not only to the best methods of instruction but to the formation of museums, where objects of art are exhibited gratis, so that a better and more correct taste might be engendered. Every nation is trying for the prizes to be gained in the establishment of great industries, leading to a general increase in its commerce, and providing labour to keep its people employed. Those that can make the most beautiful articles out of the same amount of material and labour will undoubtedly get the largest amount of trade, as the facilities of carriage by sea and railway are every day bringing the most distant countries into nearer and closer relations with each other, and will doubtless ultimately bring about a general uniformity in civilization and taste. The struggle for supremacy in the manufacture of original, ornamental, and artistic products is already keen, but nothing to what it will be. It will be a struggle for existence, and woe to the vanquished. It is felt among the western nations of Europe that the time has arrived for a determined endeavour to be made by each individual Government to give its artisans the instruction that is necessary to enable them to compete successfully. This explains the *renaissance* which is at present taking place in every branch of science and art.

The French have had such excellent schools for so long a time that they have naturally gained advantages which time alone can give; among others they have much more facility for drawing quickly than the English, and they have also greater facilities for learning the art of designing, as numbers of young men are trained in the workshops and studios, where if they show no special aptitude they have to leave and take up some other trade or profession. It is not that the genius of France is superior, but simply that England, not having started so early in the race, is at present behind. French taste has been so largely cultivated and developed, owing to the constant care of its various Governments to train and form it, that it invariably has held the field. From this standpoint no Government, whether monarchical, republican, or revolutionary, has ever swerved since the days of the *Grand Monarque*. Therefore these many generations of training in art and in the manufacture of artistic products have produced a permanent effect; and their influence is not only among artists proper, or the higher class of decorative artists, but it reaches the workmen and their homes through the museums and the workshops. An eminent authority says:—"The groundwork of all design that is worth anything is art. If the student has any talent or art-feeling within him, his power of drawing will enable him to give it expression; but without thought and imagination there can be no originality of design. Mere knowledge of drawing will not make a man a good artist any more than a knowledge of language will make him a poet; but designer and poet are helpless without the knowledge of the language by which their art can be expressed to others. Teachers need to study the peculiarities of their students, for all cannot be dressed in the same clothes or combed with the same comb." Nothing can be done without drawing. The student must draw correctly and thoroughly, as drawing is certainly the language of designers.

For opportunities and facilities to acquire this knowledge the French are far and away better placed than the English. In France, from the National School of Fine Arts to the rudimentary class at the elementary school, all is free. Moreover, throughout the whole of France there are departmental schools of the fine arts, and classes both in the daytime and evening for giving instruction gratuitously in every branch of art and design. The French evening art schools are of utmost importance, as they were established for the special instruction of artisans, and have always exerted the greatest influence on the development of art industries.

First

First of all, and standing at the head of European institutions for instruction in fine art is the *Ecole Nationale des Beaux-Arts*, which gives instruction in the arts of design, painting, sculpture, architecture, engraving, and in the engraving of medals and precious stones, and comprises (1st) Courses of oral teaching upon every subject relating to art ; (2nd) The school, which is divided into three sections, viz. : Painting, to which is attached copper-plate engraving, sculpture, together with medal engraving and engraving on precious stones and the architectural section.

There are eleven *ateliers*, viz. : Three for painting, three for sculpture, three for architecture, one for etching and engraving, and one for engraving medals and precious stones. Students are not admitted until they are 15 or after they are 30 years of age, and foreigners are admitted on application, furnished with a letter of introduction from the Ambassador, Minister, or Consul-General of their nation. These ateliers are under the charge of artists having the title of *Les professeurs chefs d'atelier*.

Besides the work done in the ateliers, the following courses of theoretical study are prescribed under other professors, viz. :—

1. History of art and æsthetics.
2. Anatomy.
3. Perspective.
4. Mathematics.
5. Descriptive geometry.
6. Geology, physics, and elementary chemistry.
7. Strength and cost of materials, superintendence, and accounts. *Administration et comptabilité, construction et application sur les chantiers.*
8. History and archæology.

These courses are obligatory, but not equally so upon all. All must pursue the courses upon history, æsthetics, and archæology. The students of painting, sculpture, and engraving are required to study in addition anatomy and perspective. The students of architecture can omit the course upon anatomy. Besides the professors already mentioned, extraordinary instruction upon subjects connected with art is occasionally given by persons not connected with the school on receiving permission. Connected with the government of the institution are a director, a secretary, an inspector, a conservator of models and works of art, and a librarian, with their respective assistants, all nominated by the Minister and placed under the immediate authority of the director, appointed by Imperial decree for a period of five years. The director alone has charge of the execution of all regulations, corresponds with the administration upon the affairs of the school and control of the funds. Besides these officers there is a superior council (*conseil supérieur d'enseignement*) of which the professors having charge of the ateliers can not form a part. It is composed of the superintendent of fine arts, who is its president, the director of the administration of fine arts the vice-president, and certain professionals appointed by the Minister, namely, two painters, two sculptors, two architects, an engraver, and five other members. It performs its functions gratuitously, and one-third of its members can be immediately reappointed.

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The great feature for the encouragement of the study of the fine arts is the prize which gives the opportunity of a residence at Rome (*grand prix de Rome*), which is open to competition not only to members of the school, but to all French citizens between the ages of 15 and 25. Members of the school can also compete, without being compelled to study for any specified time, so that no obstacle is put in the path of the more energetic, and those inclined to make rapid progress. These examinations are held in the school annually for painting, sculpture, and architecture; every two years for the engravers upon copper-plate; and every three years for the others. After two examinations, the best ten in each class are selected for a final examination for the great award, the successful aspirant to which is sent to Rome (*grand prix de Rome*), the mode and programme of all the examinations being drawn up by the superior council. This council selects also a list of names of judges for each class, which list is presented to the Minister, who chooses from it the five juries of award, consisting of nine members for each of the three classes—painting, sculpture, and architecture—and five members for each of the other two classes, the engravers of medals and precious stones forming one class. Each jury passes judgment upon one class only, the results of both the preliminary and the final examinations being laid before it; hence the result cannot fail to be more fair than if the decision depended upon one examination alone.

The successful aspirants—one in each class—are now sent to Rome, where they are obliged to remain two years, after which they can travel two years longer, following their own tastes, but must previously notify the administrations of their intentions. During these years they receive a regular annuity from the Government. An exception is, however, made for the fifth-class—the engravers of medals and precious stones—who receive this annuity only three years, and must remain in Rome for the same length of time as the others. During the stay of the students at the school a regular report of their progress is made every three months by the professors placed over the ateliers to the director, who transmits these reports to the superior council. If any of the students appear to possess unusual talents they are recommended by the council to the Minister as deserving particular encouragement. A report of the progress and occupations of the prizemen is made to the Minister every six months by the Director of the Imperial Academy at Rome.

The *Ecole des Beaux-Arts* has an extensive and excellent museum; (1) containing plaster casts from all the greatest works of antiquity, the middle ages, and the *renaissance*; (2) a museum of copies of painting and sculpture after the works of the great masters; (3) the works which have obtained the *grand prix de Rome*, *le prix de demi-figure peinte*, *le prix de la tête d'expression*, *les prix Jauvain d'Altainville*, all of which are of great importance in the *concours* of students in painting, sculpture, and of architecture; (4) a collection of designs serving to demonstrate the lectures in the courses of anatomy, descriptive geometry, stereotomy, natural physics, chemistry, and construction; and (5) all the objects of art given or bequeathed to the school. These collections, together with the library, are open to students.

The *Ecole Nationale des Arts Décoratifs*, situated in the *Ecole de médecine*, was founded in 1765, by J. J. Bachelier, for the purpose of giving instruction to workmen, and two years later it was called the Royal Gratuitous School of Design, *Ecole gratuite de dessin*. Afterwards it was called the *Ecole nationale de dessin et de mathématiques*, and it was not until 1877 that it received its present title. It has been known

known among students for many years as the *Petits Beaux-Arts*, and is, next to the Beaux Arts, the most important of all the French schools of art. Instruction is given both in the day time and during the evening, and includes freehand drawing and ornament, modelling, drawing from the antique and from life, mathematics, geometry, architectural construction, history of ornament and decoration. There are sixteen professors and teachers, inclusive of Mr. M. A. Louvrice de Lajolais, and these meet every month under the presidency of the director, to decide any questions that may be submitted, to examine the progress of the students' work, to study new methods of instruction, and to formulate and arrange the programmes for competition, and to decide upon the pupils to be recommended to the Minister for Instruction and Fine Art for any bursaries that may become vacant.

After admission into the school the pupils are classed in their respective divisions by actual competition, and no one is admitted into a division by a simple example of work done outside. Parents and guardians of pupils have the right to furnish them with a book, which is examined each day by the professor in charge of the class, who not only indicates the presence of the pupil, but his conduct also during his presence at school.

I visited this school several times and both M. de Lejolais and M. Menard showed me every attention and gave me all the information I desired. There are over 800 students. Day scholars must be able to read, write, and cypher, and 10 years of age before they can be admitted. Evening pupils are not admitted before they are 14 years of age. The lower class draws from the flat, but upon asking M. Menard's opinion upon this debatable question he stated "that drawing from the round should be employed exclusively with pupils of intelligence, but that if the pupils were dull of comprehension, they got a quicker perception of what was required, by permitting them to copy drawings either of ornament or the figure." The system is one of constant competitions which take place monthly in every division of the school. Students get admission to a superior class or division at these monthly competitions, but he must have obtained a minimum of fifteen points. All the advance classes draw and model from the antique and from the life. They learn linear drawing and drawing from models; also composition or designing. The examinations and classifications are made for the monthly competitions by three professors, under the presidency of the director, while for the annual competitions the judges are six professors, and the President, besides other judges, which may be appointed by the Minister.

Designs are made for decorating all kinds of materials and special workshops for the study of industrial designing. These classes are daily, from 1 to 5 in summer, and 1 to 4 in winter. Many of the works done by the students, in their annual competitions, are conserved in the School Museum, and among them are many excellent drawings and models. Another phase of this institution, which is indeed common to the National Art Schools in all the departments of France, is the public lectures on art subjects which take place every Sunday morning. The instruction is entirely gratuitous and of the most excellent character. In management and discipline the school leaves nothing to be desired.

This school has perhaps more than any other school of art in the world been the pattern which other nations have taken for their model. It has been directed by eminent men ever since its foundation, nearly a century and a quarter ago. It

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is the model school of the national system of art education by the State, for this class of school has been established in all the chief cities and towns of France.

My object being to furnish types of the schools of art in different countries, together with an exposition of the system or method of instruction employed, I shall not enumerate all the schools I visited, but simply describe a typical school of each class. Of the departmental schools in France, I shall describe the *Ecole des Beaux-Arts of Lyons*; the *Ecoles académiques of Lille*; the *Académie communale de dessin, peinture, sculpture, architecture, &c., of Valenciennes*; the *Ecole régionale des Beaux-Arts of Angers*; the *Ecole Municipale des Beaux-Arts et des Sciences Industrielles of Toulouse*; and the *Ecole Municipale et Régionale des Beaux-Arts at Nancy*. These, together with the schools of the municipality of Paris, will suffice to show the manner in which art schools are managed and conducted in France.

The *Ecole des Beaux-Arts* of Lyons was instituted with especial reference to the needs of the industrial arts and particularly for those who are to be employed in designing for the silk looms of the city. The school is placed under the supervision of a director appointed (by imperial decree) whose office is properly only executive. His duty is to supervise the work of the professors and the scholars, and he is responsible for the archives, models, and other apparatus belonging to the institution. He is ordered to allow no change in the prescribed order of instruction, this being carried so far that he must prevent the use of any models except those furnished and recognised by the school. All infractions of these rules must be by him reported to the prefect of the Rhone, he himself having no power of punishment over the pupils, beyond fifteen days' suspension. Under his orders are the secretary, the monitor (whose care it is to see that all the pupils are present and orderly), and the janitors and porters. The professors are not subject to his orders, although they are to look to him to supply their places in case of their absence.

The director and professors form a council of administration, presided over by the prefect or his substitute, holding its meetings once a month. The secretary is present, but simply as a clerk. The most important duty of the council is to decide upon the degree of advancement arrived at by the students, in order to classify them properly. But their decisions are not valid without the signature of the prefect himself.

The branches taught are the following :—

- Class 1. Elementary drawing, and drawing from the antique.
2. Drawing from the living model.
3. Painting from the living model.
4. Sculpture and ornament.
5. Architecture and ornament.
6. Engraving upon copper-plate, wood, and stone.
7. Drawing and painting in water-colours from flowers.
8. Composition applicable to manufactures.
9. Course of perspective.

The third-class and the painting of flowers in oil are optional. But the study of the human figure, being useful in both art and manufactures, is required of all. The painting of flowers in water-colours is especially directed to the benefit of those who are to be engaged in drawing patterns for the manufactories. To become a pupil  
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of the school the applicant must be of French birth, must have completed his twelfth year, and must be able to read and write, besides having some elementary knowledge of arithmetic. It is also required that he have been vaccinated, unless he has had the small-pox. If his parents are not residents of Lyons he must find some citizen to be responsible for him.

No foreigner or child of foreigners can be admitted except by permission from the Prefect, and until recently such were not allowed to contend for the prizes. If there are more applicants than can be admitted, those are preferred who intend to become draughtsmen in the silk manufactories of the city. If the applicant is somewhat advanced he is permitted to enter an advanced class, but must first execute one or more designs under the eye of the professor of the class into which he desires to enter. These drawings are presented to the Council, which decides upon his petition. Before this Council are brought such designs executed by the newly-admitted members as the professor of the elementary class selects for that purpose, and the Council decides whether those who have drawn them shall be admitted into the school, a regulation designed to prevent the admission of all not endowed with sufficient talent to profit by the instruction.

The school is well placed in the best quarter of the town, and the buildings are well laid out, and in good taste. The teaching is entirely gratuitous, the funds for the purpose being furnished by the Municipality, assisted in a small degree by the Central Government. It has been productive of much good, and turned out many distinguished artists. The city of Lyons provides funds also for five municipal drawing schools, so fully do they recognise the necessity for giving instruction of this kind to all classes of the community.

Manchester is already becoming a powerful rival to Lyons in the silk industry, and many of the manufacturers seemingly are lulling themselves in a sort of false security on account of their natural advantages. Great stress is laid upon the fact that French taste is superior to the English, and nothing can be truer, but one can easily divine the reason. In France for generations the children have been taught drawing as a part of their education. This drawback will cease to exist if England will provide the same high-class gratuitous schools, in which a love for the beautiful will be engendered, and the taste of the artizans improved.

The *Ecoles Académiques* of Lille are an excellent type of an art school. The teaching comprises linear drawing, drawing from the figure and cast, modelling, the study of painting and composition, anatomy, perspective, geometry applied to the Arts, and the elements of mechanics, elementary architecture, and a class for the training of teachers. Linear drawing comprises outline drawing of the figure and ornament and mechanical drawing. This course takes two years. The first year the pupils are exercised in freehand drawing upon the blackboard and upon paper, and in the second they are taught the use of the scale and compasses. The minimum age for admission is nine years, and the pupil must be able to read, write, and cypher. Where however a child is endowed with a precocious love of and talent for art, the administrative commission of the school can dispense with the usual conditions. The classes are open every day excepting Sundays and Thursdays. In drawing the figure from the life and antique the School of Design is divided into six classes. The first class is entirely occupied on the living model, while the second studies the cast from the antique. Both these classes are under the particular charge of the directing professor. The third-class studies academical



figures from engravings, the fourth are engaged on enlarged heads of the human figure, while the fifth and sixth are elementary and advanced classes of designing. These four classes are under the second professor.

In the month of October, which is the beginning of the school year, the professor director and the second professor compose and arrange the classes for the year, placing the pupils according to their several capacities. No pupil is admitted to this course until he has gone through the previous course of linear drawing and ornamental drawing, or otherwise has given the Commission such proofs of his aptitude as in their opinion are sufficient. In every such case the decision is made by the Commission.

The course of painting comprises the study of the figure from life, and the study of composition.

Young men desirous of becoming students in the school of painting, if they have not followed the course of drawing from the life, must make a drawing of the figure under the eyes of the professor, to enable the professor to form a judgment as to whether he is sufficiently advanced to be admitted to the course.

This class is open every day, excepting Sundays, for three hours in the morning, commencing at 6 in the summer and 8 in the winter. The pupils are expected to frequent the picture-gallery, and there to make such studies as the professor may direct.

Independently of two annual competitions in which all pupils are expected to exhibit a figure painted from the life, there is a competition for an historical composition. The first Monday of each month the professor gives out a subject for a composition for treatment in the class. At the close of the class each pupil gives his sketch to the professor. These are all forwarded to the Commission for examination, and are afterwards returned to the pupils, with the remarks of the Commission and professor to be painted or drawn in accordance with the directions. When the pupils show they have become sufficiently advanced there is a special competition, at which each student is compelled to exhibit. The subject for this competition is chosen by the professor, and approved by the Commission.

The course of anatomy was specially instituted for the pupils of the painting classes, of drawing from the life, and of modelling. All students on leaving the class of drawing from the antique are obliged to follow this course, until such student has been honourably mentioned at one of the school exhibitions. The professor teaches particularly osteology and myology, in order to give the student that knowledge of the physiology of the human body by the description of the skeleton and of the muscles that cover it.

The modelling class has for its object to model in clay or wax from the life or from the cast. No pupil is admitted to this class until he has followed the classes of elementary and advanced design, or shown such aptitude for the work that his case may be particularly referred to the administration. It is open every evening from half-past 7 until half-past 9.

The course of geometry applied to the arts, comprises :—(1) elementary and descriptive geometry, with appl'cation to the projection of shadows; (2) the applications of geometry to the various handicrafts, such as the carpenter, blacksmith, and  
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mason, and to teach the first principles of mechanics; (3) the description and construction of the most common machines, such as the lever, screw, wheel and axle, cranes, capstans, hydraulic presses, steam-engines, &c. This course takes two years, and no pupil is eligible for admission who has not previously followed the course of linear and mechanical drawing, or to give such other proofs as the Commission may require, to show he has the necessary knowledge. This is usually done by an examination by the professor. The classes are open every evening, excepting Sundays, from half-past 7 to half-past 9.

The special object of the course of elementary architecture is to teach (1) the knowledge and usage of the materials employed in building, the practical processes of the constructor, the drawing of plans and sections of buildings, and levelling; (2) the study of ornamental drawing, and the various orders of architecture; and (3) the study of architectural composition. Every year, at the end of the course, the professor gives practical lessons in the plans and sections of buildings, and in levelling. The course takes two years, and no pupil is eligible until he has duly graded in the courses of linear drawing and applied geometry. The classes are open every evening from half-past 7 until half-past 9.

The course of perspective drawing comprises the class of perspective that is useful to the painter and architect, aerial perspective, theatrical perspective, the reflection of objects in smooth water and in mirrors, and the perspective of shadows. The course lasts two years and is compulsory for all students of architecture, for the classes of drawing from the life and the antique. It is understood they follow this course until they have obtained an honourable mention at one of the annual competitions. The class is held on Thursdays from 5 p.m. until 7 p.m. during the first year, and on Sundays from 8 a.m. until 10 a.m. for the second year.

The *Ecoles Académiques* are open to all the youth of the region who can read, write, and cypher, otherwise, as before stated, they cannot obtain admission.

At the end of the year a competition takes place in each class, when medals and prizes are distributed to the most meritorious pupils. Those who have obtained a first prize pass by right into a superior class; the administration decides on the others after the competition, according to the advice of the professor. The names of the students who obtain medals in the painting, modelling, and architectural classes are inscribed upon tablets placed for that purpose in the halls. The works that have gained first prizes remain at the school, where they are framed and hung at the expense of the administration, the author's name and the year being indicated on the frame.

In the school for the training of teachers for art schools, municipal schools, and high schools, the instruction consists of pedagogic exercises, which take place every morning. For admission to this normal school aspirants have to pass an examination before a jury composed of the administrative Commission, the professors and the delegates appointed by the inspector of the drawing classes. The subjects for examination are (1) a written composition of general history, for which 2 hours are allowed; (2) drawing after an ornament in relief, 6 hours; (3) a drawing from a bust, 8 hours; (4) a sketch of any common object, 1 hour; (5) a geometrical drawing of the same object, 6 hours; (6) an examination upon the elements of perspective and anatomy, 2 hours for each subject.

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Besides the pedagogical exercises, the student-masters are obliged to regularly follow the other courses of the school, that is to say, in the first year: The courses of architecture; drawing from the round; drawing from the antique and ornament alternately; course of geometrical, perspective, and freehand drawing; anatomy; and the history of decorative art. In the second year: Architecture; drawing from the round and from the life; perspective, geometry, and freehand drawing; anatomy, and art history.

The museum and library are open every day to the students where they can draw from the antique, or consult the books in the library.

The *Académie communale de dessin, peinture, sculpture, architecture, etc.*, of Valenciennes, for boys and girls, was reorganised in 1883, with the concurrence of the Government of the French Republic, and is composed of the most distinguished artists of the town of Valenciennes and members of the Administrative Commission, of which more will be said hereafter. When an artist desires to join the academy he must present an example of his work. This will be judged at a meeting at which all the members of the academy, together with the professors, can vote. If the work is approved, the artist will be admitted in the quality of candidate, and he will be given a subject in his particular class of work for his reception picture. Afterwards, another vote will determine whether he is to be received in quality of an academician or not. The academicians only who have passed this double proof have the right to vote upon all matters of art with the members of the Administrative Commission, the *agréés* having only the liberty to speak, and not to vote. The members of this Commission are appointed by the mayor, excepting two, who are appointed by the Inspector of Instruction. The details of the duties of this Commission are given in Appendix —.

The *Ecoles Académiques* comprise:—

1. The study of classic drawing up to the point insisted upon to obtain the *diplôme d'aptitude à l'enseignement du dessin*, in the high schools and universities.
2. The study of classic modelling.
3. The applications of drawing and modelling to the different professions and industries.

The programme of instruction is as follows:—

- (A.) An elementary course of freehand drawing, elementary drawing from the round, of 7 hours per week.
- (B.) A course of decorative drawing after the cast, or from living plants.  
A course of modelling from the life, after the antique and the living plant; antique ornament, *renaissance* ornament, composition, &c.  
The duration of these courses are seven and a half hours a week during the summer season, and fifteen hours during winter.
- (C.) A course of sculpture applied to different matters, in marble, wood, and stone, &c.  
This course will occupy seven and a half hours a week.
- (D.) An advanced course of drawing and painting. Painting from nature, from the antique, plants, landscape; drawing from the life and from the antique, &c.
- (E.) A course of drawing and painting applied to different industries.
- (F.) A course of anatomy.

Five hours a week are given to the E. class, and two and a half hours to anatomy. (G.)

- (g.) A course of art history will be given once a week during an hour.
- (h.) An elementary course of geometrical drawing and projections, obligatory for all students, will be given by a professor, who will give six hours a week to this instruction.
- (i.) A course of descriptive geometry, shading, drawing to scale, study of architectural orders, the elements of construction in wood, stone, and iron ; general construction, and architectural composition.
- (j.) A course of perspective, compulsory for all students. These two courses will be given by the professor of architecture, who will give ten hours weekly to the first and two hours to the second.
- (k.) A course of mechanical drawings for workmen. Nine and a half hours weekly.

Evening classes will be held during the winter season from 7 till 9 o'clock, by the professors of painting and sculpture, which, with the exception of the study of the living plants, will reunite all the day classes.

Students are expected to draw from the antique in the museum, and also from such paintings as the professor may indicate.

The course given to girls is essentially professional, and comprises, besides a class of ornamental drawing, a class for decorative and ceramic painting, imitation of tapestry, &c., &c. This course is divided into two groups, and six hours a week given to each.

The instruction in the Normal School for the training of teachers is precisely the same as that described in the *Ecoles Académique* of Lille.

At the end of the school year a grand competition will take place in each class. The time and duration of this competition, together with the subjects of the compositions and their dimensions, are determined by the administrative commission. The works are judged by the general assembly, professors being admitted for consultation.

Prizes, consisting of medals, drawings, or books relating to art, will be distributed after the competition to those students who shall have distinguished themselves, by the mayor and corporation, the administration, and the academicians, assisted by the associates and honorary members.

An exhibition of the work of the pupils will take place every year, the commission determining what students shall take part in it. The names of those students who gain the first prize will be inscribed in letters of gold upon a tablet fixed in the hall of administration, and the student receives a certificate to the effect that he has gained the first prize, and his name is duly registered in the academy.

The *Ecole régionale des Beaux-Arts* of Angers was until 1885 a municipal school, but was then transformed into a regional school, and took the above title.

The budget of the school is fixed at £600, which the municipal authorities furnish, assisted by a subsidy of £200 from the central government. They also provide the school building, the furniture, and everything necessary for the maintenance.

As a regional school it is under the inspection of the Minister for Public Instruction. Its officers are appointed by the prefect, having been proposed by the mayor. The appointments are confirmed by the administration of the Beaux Arts.

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The staff is composed of a director, two professors and an assistant professor of drawing, a professor for each of the following subjects: anatomy, geometrical and architectural drawing, linear drawing and descriptive geometry. Three professors of stereotomy, and two superintendents.

This school, which is a fair type of the lower grade of regional establishment, teaches artistic and industrial drawing with their various applications. There are eight classes, viz.:—1. An elementary course of drawing twice a week, comprising the first elements, freehand drawing from the round, &c. 2. A course of imitative drawing three times a week. 3. An advanced course of drawing, including freehand drawing from the round, drawing from the life and from the antique, natural objects, painting and modelling; this class is held five times a week. 4. An anatomical class once a week, and its application to the fine arts. 5. One course of art history, comprising the history and composition of ornament, twice a week during the second part of the school year. 6. A course of geometrical and architectural drawing, including linear drawing, shading, freehand, sketching from models with dimensions, projections, and perspective, twice a week during the first part of the school year. 7. A course comprising the elements of linear drawing and geometry, also descriptive geometry in its application to mechanics. 8. A course of stereotomy, including the teaching of handwork in stone-cutting, carpentry, and blacksmiths' work, six times a week, from October to February inclusive. The pupils to be admitted to the school must be 12 years of age, and be able to read, write, and cypher. The other regulations are much the same as those of the regional school of Valenciennes, with the same class of competitions.

Considering the small amount of the school budget, this type of school is very remarkable. Of course the salaries of the professors and teachers are necessarily low, but nevertheless the quality and quantity of work done are to be highly commended, and, as reorganized under the late regulations of the central government, these schools are calculated to do an enormous amount of good. In short, instruction in drawing of the highest class is furnished gratuitously to all the youth of France, and plaster casts of art subjects, inclusive of the famous antique statues, are most liberally furnished by the nation. Every facility is given in art instruction, and the cultivation of that good taste for which France has been, and continues to be, famous. Nothing is left to chance, but, from the public school to the art classes, all the French nation is thoroughly grounded in art and its various applications.

Toulouse has had an artistic reputation for many years. Its ancient documents and precious manuscripts, illuminated with the rarest of greco-byzantine miniatures, establishes conclusively the fact that correct taste, together with a practice of the art of drawing, were preserved after the Roman conquest, in spite of the inroads of barbarians and the violent lawlessness of the nobility. At all events, from the Thirteenth Century to the present time, the progress and development of art can be correctly ascertained, and even the names of painters have been preserved since the time of the Renaissance. Nicholas de Troy, pupil and successor of Chatelle, was the originator of the idea to found a school of art in Toulouse. This was in 1640. His son, Jean de Troy, also a painter, wished to follow in his father's footsteps, but finally he retired to Montpellier, where he founded an academy of painting, sculpture, and architecture. During this time, however, his friend, Dupuy-Dugrèz, a parliamentary advocate, and an impassioned amateur of the fine arts, and an author of a treatise on painting, created at Toulouse a society for the protection  
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of the fine arts, and instituted a silver medal in favour of local artists. The project of Nicholas and Jean de Troy was vainly followed by their successors, Jean Pierre Rivalz and Jean-Michael, but Antoine Rivalz, the son of Jean Pierre, succeeded, where all the others failed, and opened the first public school in which drawing was taught from the living model. This school at first was only composed of the pupils of Rivalz and several other artists connected with his studio, but, little by little, it gained in importance, and in 1746 was regularly and definitely constituted under the direction of Guillaume Caurmas, the successor of Antoine Rivalz, and in 1750 was, under Louis XV, called the Royal Academy of Painting. At the time of the suppression of academies, in 1793, the national convention did not suppress this school, but preserved it, under the name of *l'école de dessin et de peinture*, as an establishment dedicated to giving instruction in art. The academy of painting, founded by Antonie Revalz, was therefore maintained as a free society during the whole time of the revolution, by the side of the *Ecole Centrale* created by Lallanal in 1795. In 1804 a ministerial decision appointed an administrative commission to the *Ecole spéciale des sciences et des arts de Toulouse*, which commission was afterwards called the school council. This administration was composed of the mayor, who was the president, and two members of the Municipal Council, of two laymen, and two directors. The first work of the administration was to organize a staff of officers. This was in 1805, and chairs were instituted for drawing, painting, and modelling, from the living model; (2) elementary drawing from the round and the antique; (3) painting and anatomy; (4) sculpture; (5) architecture and perspective; (6) history and costume; (7) stereotomy and practical geometry; (8) mathematics; (9) natural history and botany; (10) experimental physics; (11) chemistry; (12) astronomy, with librarians and curators for the museum. The budget of 1808 amounted to £1,285.

The school of Toulouse is therefore the legitimate child of the academy, founded by Antonie Revalz, in 1726; that the teaching has varied little since the time of the revolution; that it has always been and continues to be the oldest and best organized school in the province. The English Commission of 1881 report that "this school is well known as being one in which by its special system of instruction a knowledge of drawing is very rapidly acquired, and some of the most eminent artists of France owe to it their early training. Among others, M. J. P. Laurens is a past student of the school. It is absolutely free in all its departments." No admissions to the schools are made under 10 years of age, and the applicant must be provided with a certificate of having received his primary instruction; they have also to produce a medical certificate stating that their health is sound and that they are free from any contagious malady. They have to be obedient and respectful towards their masters and to everyone of whatever title who may be charged to direct, teach, or superintend them. Any infraction of orders, morals or discipline, is severely punished. All regulations are strictly adhered to, and the professors assemble under the presidency of the sub-director upon the first Saturday of each month, and at such other times as the sub-director may appoint. These reunions take place for the purpose of discussing the programmes of competitions, to choose the three professors to judge the monthly work of the students, and to discuss and deliberate upon all questions relative to teaching method.

The method of teaching is as follows:—The professor takes a number of his pupils (say) six to eight, and places them in front of a black-board, upon which he draws in their presence the object or form he desires them to copy. This  
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is copied on slates by the pupils. Sometimes these are geometrical forms, and the pupils draw on slates that have been scratched into squares in the same way as those used by M. M. Jessen & Stuhlmann, in Germany, which method will be described hereafter. From drawing geometrical figures they pass to the next class, where not only the plain slate is used, but sugar paper, upon which the pupil draws with charcoal. The geometrical solid is used as a model in this class, and the pupils are encouraged to use rulers for outlining the work, instead of the free-hand. The models are the usual solid forms, squares, cubes, prisms, and spheres. From this class they pass into another which copies from the flat, which gives them some idea of composition and pictorial effect. The next class is engaged in copying ornament from lithographic engravings, and afterwards from the round, from which they make careful drawings, very nicely shaded. They then pass on to the cast, and are occupied upon fragments of the figure, hands, arms, feet, &c., and from this they go to the antique.

The classes are now divided, and the students who intend to become painters are separated from those designed to be sculptors. The former draw or paint from the life four hours every morning, from 8 to 12. The model posing 45 minutes in every hour. The sculptors model directly from the life in a separate class, which takes the living model and the antique alternately week by week.

The students have competitions monthly, quarterly, and half-yearly, for the purpose of emulation and the proper classification of the students. There is also an annual exhibition where prizes are given. The best work at the monthly and quarterly exhibitions are hung in the exhibition gallery of the school for a week. The first and second prizes in the classes of architecture, painting, and sculpture at the annual competition are exhibited for a week in the *grande galerie* of the museum.

Besides these competitions there is each year a competition for the grand municipal prize, which is successively awarded to painting, sculpture, and architecture. This prize is an exhibition of £60 a year, to enable the student to go to Paris and continue his studies at the *Ecole Nationale des Beaux-Arts*. In the case of the student going into competition for the Prix de Rome, the subvention is prolonged for another year. No student can take part in the competition at the end of the year, unless he has regularly followed the courses at the school for at least one year, and the works gaining the municipal grand prizes, belong to the school, and they are framed and hung in the museum.

Elementary morning and evening classes exist. The former meeting from 6 to 8 on summer mornings, and the latter from 6 to 8 on winter evenings. These are mostly attended by apprentices. The mechanical drawing classes are largely attended, and the progress of all the pupils seems most satisfactory. There are twenty-five professors and assistant professors. No professor can be appointed under thirty years of age, and the appointment is made for ten years. The salary is about £50 a year. There is an excellent library attached to the school, and also a very good museum.

*The Ecole Municipale et régionale of Nancy* is another of the latest reorganizations of the municipalities assisted by the Government of the French Republic, wherein the instruction is entirely free, and carried out on the most useful and economical lines. It is placed under the authority of the mayor, assisted by a council of superintendents,

superintendence. Instruction is given in (1) linear drawing and geometry, perspective, and the elements of architecture; (2) drawing, modelling, and comparative anatomy; (3) ornamental design; (4) the history of art; (5) painting in oil, water-colour, and distemper; (6) a normal course for the training of teachers. The instruction is well arranged, and the classes follow each other in admirable sequence.

The school is managed by a director, appointed by the prefect and proposed by the mayor, who is the chief of the staff, and president of all meetings of professors. It is also his duty to forward minutes of all meetings to the mayor, together with his own opinion and advice. He is also president of all juries, and makes a yearly report upon the general situation of the school, suggesting any improvements that may be made, either in the method of teaching or in the better administration of the establishment. He authorizes and controls all expenses within the limits of the school budget, and conformably to the rules of the Government as regards the public accounts. He may be a professor of the school. He is assisted by an administrative agent, appointed by the mayor, who is charged with all the details of administration. This officer sees that all the orders of the director and the decisions of the committee of superintendence are duly carried out; he is the secretary of the council of professors, regulates the admission of students, and is responsible for the books and works of art belonging to the school.

The teaching staff comprises :—

1. A titular professor of architecture, who teaches elementary geometrical drawing, isometrical projection, perspective and shading, mechanical drawing in construction, carpentry, masonry, machine work, architecture and architectural decoration.
2. A titular professor of drawing and painting, who teaches drawing, practical perspective, painting, ornamental designing, decorative painting, designing for room-paper, woven fabrics, painting on porcelain, &c., &c.
3. A titular professor of modelling and sculpture, who teaches modelling in all stages, carving in stone and wood, and sculptured decorations in all its forms.

Each one of these titular professors is assisted by assistant professors, according to the regulations. He confides to them the care of certain courses, directs them, and is responsible for the instruction they give.

On the 1st of each month the professors assemble under the presidency of the director, or, if occasion requires, the director can convoke a meeting at any time. At these meetings the school programme is decided upon, any change in the classes or methods of instruction are discussed and decided. These decisions are submitted to the mayor and other municipal authorities for their approval.

One of the special features of these new regional schools is the course which is always given for the training of teachers, who here graduate and obtain their diplomas in the first and second classes, which are required by the State from professors of drawing in the various lyceums, colleges, and normal schools.

No pupil is admitted in the upper division and to the special course if, on competition, he is not found by the jury to be eligible, either from direct competition or by other proofs showing him to be thoroughly conversant with each of the subjects of the programme of the elementary division. On being admitted he cannot maintain his position unless he regularly follows the courses of drawing, ornamental design, and the history of art.

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The elementary drawing classes and the modelling class are open to the children resident in the town, without their being inscribed upon the register of the *Ecole des Beaux Arts*.

The municipal drawing schools of the city of Paris are of a more elementary character than the evening classes for the special instruction of artisans, and which have exerted so large an influence on the development of art industries in France. There are sixty-five of these schools open in Paris each evening of the week for instruction in drawing—this is given entirely from the cast, the drawing from the flat being entirely excluded.

By the courtesy accorded me by the Prefect of Paris, M. Antonin Cougny, *Inspecteur principal à l'enseignement du dessin* was instructed to accompany me to all the types of school belonging to the municipality of Paris. I was highly gratified with all I saw, and fully recognize the prodigious efforts made by the authorities of this marvellous city to instruct everyone, from the street *gamin* to the children of the *bourgeoisie*, in the love of the beautiful. Herein is the secret of that good taste which is Parisian; the French people have worked for it, they engraft it upon their children, and in their schools, from infancy to manhood, they are constantly studying how best to improve it. There is no royal road in the study of æsthetics—the love of the beautiful is innate to all, but the cultivation of its study has for many generations received more attention from France than from any other nation. I am of opinion, and experience teaches that if other nations gave the same amount of time, study, and perseverance to acquire correct and refined taste, based upon that knowledge and appreciation of the antique for which France has been famous since the period of the Renaissance, then they also would reap what they had sown, and learn absolutely that drawing is the foundation of good taste.

The French begin at the earliest age, the (*Ecole maternelle*) maternal school is an establishment of education, as well as an asylum or shelter school. Infants of both sexes, from 2 to 7 years of age, are admitted, and receive such care as will best develop their moral and intellectual qualities. Here they are guided, as it were, into the first elements of drawing, the instruction being conveyed more as a recreation than as a task. The senses are trained in these schools according to what is known as the Kindergarten system, comprising :—

1. The first principles of moral education, knowledge of common things, the first principles of drawing, writing, and reading, exercises in language, notions of natural history and geography, and little recitations.
2. Manual exercises or school hand-work.
3. Singing and graduated gymnastic movements as in the Kindergarten. These schools are exclusively directed by females, and much importance is attached to the training in these schools by all who advocate the development of manual work in the elementary school. The next school in the Parisian system is that of the primary elementary (*Ecole primaire élémentaire*). The instruction given includes moral and civil duties, reading and writing, grammar and elements of French literature, geography, particularly that of France, some notions of law and political economy, the elements of natural science, physics, and mathematics, with their applications to agriculture, hygiene, and industrial arts, manual work and the use of the tools employed in the ordinary trades, the elements of drawing, modelling, and music, also military drill for the boys, and needlework for the girls.

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In the primary schools the instruction is divided into three courses, viz., the elementary course, the middle course, and the superior course. Each of these courses are divided into as many classes as the number of pupils require. The number in a class ought not to exceed from thirty-five to forty.

To all these schools evening classes are attached, where drawing, singing, and technical subjects are taught, open from 8 to 10 for men and women, and attended largely by artizans, apprentices, and young people who work in factories during the day.

Then come the superior primary schools where freehand and geometrical drawing, also drawing from the cast, are all taught and made an important feature of the instruction, after which there are special establishments for instruction on technical and professional subjects.

In 1884 there were 128 maternal schools with a total of 20,215 children. These required 128 directrices and 231 assistant instructresses.

There were 188 primary schools for boys with 64,556 pupils, and 174 for girls with 57,242 pupils, making a total of 121,798. To carry on the work of instruction in these schools there are 2,553 masters and mistresses employed.

There are also sixty-two half-time schools, where apprentices of both sexes can obtain that instruction required by the terms of the law of 19th May, 1874, specifying that no young people of the scholar age should be employed in factories or other industrial works unless they attended a school for a certain number of hours each day. In these schools drawing is made a most important subject. Of the manual work taught in the superior primary establishments I shall speak when treating of technical schools. What I wish particularly to point out here, is that drawing is everywhere recognised as the foundation of industrial enterprise, and that it is everywhere taught and taught well. It is considered absolutely essential, therefore the municipal administration has, for a long time, assigned it a most important position, not only in the primary schools but also in the institutions which serve as a compliment to those schools. To make a *resumé* of the teaching of drawing in all its different degrees, in the municipality of Paris, we have first the *Ecole maternelles*, where the instruction commences and where it precedes that of writing. It comprehends the combination of lines by means of laths, pieces of wood, and papers, which can be folded and cut; afterwards to make representations of these combinations upon squared slates and paper, which simple designs are made on the blackboard by the mistress; and afterwards the representation upon slates of the most simple object.

2. In the primary elementary schools for boys and girls the teaching of linear drawing is by the freehand, without the use of instruments, and this is continued throughout the elementary and middle courses under the direction of the masters and mistresses. These lessons are given twice a week, an hour each lesson. After their admission into the superior course the pupils draw direct from the plaster ornaments and figures under the direction of special teachers who are not eligible for this class of teaching until they have obtained from actual examinations a certificate of aptitude. Four hours a week in two lessons are devoted in these classes to instruction in drawing.

3. In the superior primary schools, *Ecoles primaires supérieures*, the teaching of drawing is confided to special professors, and comprises, as well as free-hand drawing, and drawing from the cast, geometrical drawing, architectural drawing, mechanical drawing, plans, descriptive geometry, and the theory of shading.
4. The special courses of drawing and modelling for young persons and adults opened in the ordinary schools during the evening for young people, apprentices, and adults. The instruction in drawing comprises—geometrical drawing in all its applications; mechanical drawing, including that of machinery; architectural drawing, with plans and sections; sight drawing, both from the cast and the life; modelling and sculpture. These classes are open every evening from eight to ten hours. They are directed by special teachers who must be duly certificated, the same qualifications being required as those from the day teachers. There are sixty-three courses organized in this manner, attended by 3,200 pupils.
5. Drawing schools for girls, *Ecoles spéciales de dessin pour les jeunes filles*, have been established by the municipality to offer to girls who desire to learn an industrial or artistic trade, such complete instruction in drawing and its applications as will in a great measure enable them to carry out their desire. There are fourteen of such schools.
6. In order to mark the extraordinary interest which the municipal administration attaches to drawing, it has attached special sanctions to this instruction. So far as concerns the day classes, the drawing competitions take place at the end of each year between the pupils of these schools, and such prizes as can be afforded are awarded to the most distinguished. A competition also takes place at the end of the year between the pupils of those schools subsidised by the municipality and the pupils of the evening classes. The prizes awarded at the close of these competitions consist of books, medals; and for young men, purses to enable them to travel (*bourses de voyage*), permitting them to study in other parts of France or in foreign countries.
7. The superintendence of the instruction of drawing is confided to special inspectors, male and female, paid by the municipality. The staff consists of a principal inspector, charged with the pedagogical direction of the instruction, four inspectors and two female inspectors.
8. The instruction in drawing given in the various establishments we have described, have both a general and theoretical character, therefore the municipal administration has to a certain extent completed the organization by instruction having specially in view the various applications to industrial operations of drawing and designing. To this desirable conclusion it has established two new schools by way of experiment, the one of preparatory practical design, and in the other the application of the arts of design to a certain number of industries. The school of practical design has been established in *Rue St. Elizabeth* in the *third arrondissement*. The instruction in this school comprises:—Applied mathematics, drawing from relief, the ornament, and the living model; decorative sculpture and decorative painting; architectural design and the history of art; history and composition of ornament. The second school which is the complement  
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of the first, is situated in the *tenth arrondissement, Rue des Petits Hôtels*. It comprises three workshops, one for the various kinds of painting, &c., on porcelain, one for the different kinds of engraving, and the third for designs for textile fabrics and for furniture.

These industries are the most important of the district in which the school is placed, and it is for that reason they have been chosen. The experiment has been made and it is in contemplation to create schools for all other industries to which art can be applied in the various parts of the city, always taking care that the classes shall have special reference to those industries which dominate in the locality of the school.

M. Guillaume, Inspector-General of Instruction in Drawing, is a member of the Institution, and was delegated by the French Administration to attend the International Congress at Bordeaux, and he there informed us that for over twenty years a reform in the teaching of drawing had occupied the French authorities in the central union of the arts supplied to industry, which is now called the Central Union of Administrative Art. In 1865 this association instituted an inquiry into the state of the instruction in the arts of design all over France. It opened a special exhibition for work executed by the pupils from all the schools where drawing was taught. The Minister of State, interposed his authority and influence so that all the Lyceums and Colleges should take part in this exhibition as well as all private sources of instruction. It was said that this inquiry proved that the real teaching of drawing did not exist, inasmuch as the copying of plates, photographs, &c., was really not drawing. M. Guillaume understands by drawing that it is to represent what nature places before our eyes; for example—it would represent, say a hall in its proper perspective, the designer placing himself to the right or left. The place chosen depending upon his own good taste. To draw, therefore, from reality is really drawing. He says that this idea seemed to come at the same time to his neighbours in Belgium, who since that period have advanced very rapidly upon this principle. He is of opinion that it is necessary to teach children in the maternal schools to draw as they are taught to read, write, and cipher, in a correct manner, and further states that he thinks there are general subjects of knowledge for which the State is responsible, and that provision should be made for development of the human activities and graphic faculties, and with this object drawing should be placed in the programme of public instruction.

As the instruction is gratuitous and the attendance at school compulsory it is clear that all the children of France are taught drawing, not in a spasmodic unhealthy way, but truly and honestly in a way calculated to bring about the most successful results, and generally speaking, the foundation laid in the ordinary elementary schools by this general teaching of drawing, affords the best possible preparation for the technical instruction which follows. The English Commission say that they are of opinion "that the ordinary schools of France excel those of England as a preparation for the technical school:—(1) As to the primary schools, in the greater attention given both to geometrical and freehand drawing, the latter almost entirely from models, to the excellent provision of these models, and in so far as it has gone in teaching the use of tools, and (2) As to the secondary schools in giving more time to mathematics, especially in the upper classes of the Lycées." Of these secondary schools I shall have a good deal to say when I come to the  
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second part of my subject ; it will be sufficient here to observe that the *Conservatoire des Arts* of Metiers has no less than five chairs devoted to the various subjects of applied art, viz. :—Geometry applied to art, descriptive geometry, mechanics applied to art, civic constructions, and physics applied to art.” A *précis* of the history of this institution, which was begun by Vaucauson in 1775 upon a plan conceived by the illustrious Descartes, will be found in my report on school buildings and technical education, 1879, from pages 113 to 118. In short, it may be said that from the most elementary school to the Polytechnic and the University, instruction in drawing and designing holds a most important position is never lost sight of, and is therefore constantly at work developing that taste for æsthetics for which Paris is famous.

Belgium has for many years paid great attention to the teaching of drawing, designing, and the industries with which these are inseparably connected. There are four art schools in Brussels, the average attendance of students being about 1,200. The most important is the Royal Academy of Fine Arts, and the others are the Molenbeck, St. Josse, and Ixelles. I visited all these schools, accompanied by M. G. Rombaut, the Inspector-General of Technical Schools, who in the most pleasing and courteous manner placed himself at my disposition. At the Royal Academy of Fine Arts pure art is taught together with the sciences with which they are allied, viz., anatomy, descriptive geometry, perspective, architecture. The history of art, &c., of which these are excellent courses, and the programme of these courses are determined by a superior council—*conseil supérieur*—and approved by the Minister. The administration fixes the days and hours at which these courses take place at the commencement of the school year. The courses are followed by the academy students, by the students of special studios, and by any other person who may have obtained a special card of admission. Each year special prizes are given. These are awarded by special juries—following upon competitions arranged by the professors—to the students who have shown the most aptitude throughout the duration of the course. I shall at once pass on to the consideration of those schools that teach drawing with a view to its being of service in the industrial life of the pupil. Drawing is taught in Kindergarten and primary schools, in all apprentice workshops, in the professional schools, and in the industrial schools, besides in a number of special institutions.

The Molenbeck drawing school was founded in 1865. It now occupies a large and commodious building, erected in 1877 by the Communal authorities in the workmen's quarter of Brussels, and has in connection with it a secondary school for girls. The arrangements are excellent, and there are about 300 students. This school was at the time of my visit in full progress, all the classes being entirely filled.

The method of teaching is different from that of most other countries, although other countries are following in the same track, or adopting some modification of the same principle, as the general opinion of the whole of Europe has changed. It is now generally recognised that to teach drawing from the copy is, as a rule, bad. Monsieur de Taeye says that to the working population (that form the majority of those who attend the public schools) drawing is not only of equal but superior importance to any other school subject. The natural welfare of an industrial people is involved in it, and that the subject should be rightly taught is a necessity in any system of elementary education. These principles governed the  
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ideas which provided for the teaching of drawing to the youngest pupils in the elementary schools, when the educational programme came into force under the new *regime*. Lessons in drawing then commenced simultaneously with lessons in reading and writing with children of 6 years of age. The general principles of the method adopted are—(a) intuitive notions of form and colour are first ascertained and developed; (b) concrete forms or objects in relief are presented before abstract forms or flat models; (c) everything must require to be understood before it is required to be reproduced or imitated. The instruction is given in four stages:—

- (1.) The first year's studies for children aged from 6 to 7; (a) dots or points in lines, groups, and other combinations; prints cut out of paper and applied as ornaments; (b) depths of tone or shading produced by making the dots denser or sparser; (c) notions of colour, experiments to ascertain the existence of colour-blindness, distinctions, and denominations of colour; (d) imitations of common objects in relief; (e) straight lines, vertical, horizontal, and oblique, exercises to train the hand to trace straight lines; (f) parallel straight lines and their application to ornamentation towards the end of the course, when the exercises have become familiar they are all repeated from memory. The black-board, the slate, or the paper respectively upon which the exercises are worked in the first year are ruled in squares. All exercises are done with a freehand, no instruments beyond the pen, pencil, or crayon being used.
- (2.) The second year's course for children from 7 to 9 commences with a recapitulation of the preceding lessons, but the board, slate, or paper is marked with points in place of lines in squares. Curved lines are now introduced, and combinations of straight and curved lines, the object being to induce suppleness and firmness of hand by very copious exercises. Depth of tone and colours again follow in the order of the first year's studies, with the exercises upon common objects in relief, the applications of the curve to the profiles of vases are now explained, and then combinations in gothic letters and arabesque and other figures are studied. The course finishes with combinations of interlaced bands of straight lines and curves, and, as before, the repetition of the whole of the exercises from memory.
- (3.) The third year of study commences with children of eight years of age, when already the aid of squares and points on the exercise paper is dispensed with. This system of lines and points, called by the Germans *Stigmographie*, continues for a year longer in Austria, Germany, and Switzerland, their aid being only dispensed with at the age of nine. Under the Belgium system the exercise paper is at this stage quite plain, but it is figured on the margin with the divisions of the metrical scale. After the usual recapitulation, the simplest elements, lines, again form the subject of study. Lines in all directions are bisected, trisected, and divided in a given number of equal parts, and the exercises are very numerous. The chief object here is the formation of the *coup d'œil*. The eye is trained to seize accurately, at a glance, the various relations of lines to each other. Curves are next introduced, firmness of hand, as well as accuracy of glance, being developed by the second step. Then follow, in the same order as in the previous years, tones or shading or colour and other ornamentation, and the reproduction of common objects, and lastly, drawing from memory.

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- (4.) The last year of studies carries children of ten, eleven, and twelve, and sometimes up to fourteen years, on to the study of geometrical drawing and perspective, and it includes both freehand and the use of instruments, but no help is given in aid of measurement by marks on the exercise paper. Solid figures and natural objects of the most complicated forms are now taken, and the finest models of antique art are set before the pupils.

This system, says M. de Taeye, is logical throughout, and a complete negation of the old and vicious system of drawing from "the copy." In its various stages it might be said to be the work of several nations; in England, Herbert Spencer had enunciated the principle that intuition should precede instruction. In France, M. Guillaume had declared that "the teaching of drawing should be based upon science"; the principles on which the method should be constructed were indicated by a German minister. An Austrian, Herr Hillart, has the credit of formulating the details of such a method, and finally to a Belgian, M. Germain, was due the honour of practically carrying the system out, with certain modifications, as a portion of the national system of primary education in Belgium.

The system is in harmony with the spirit of the instructions given by Herr von Müller, the German Minister of Instruction, from which I will quote the following passages:—"The teaching of drawing has not for its object to produce artists, but to exercise the pupil in the elementary practice of art, to enable him to acquire a knowledge of the laws of form, to give him a quick and sure eye, and a firm but light and accurate hand. It is less important that the pupil should draw picturesque objects than that which he draws should be exact." The aim was not to give a child a special education as professional and industrial, and schools serve this purpose, but to train him so that he would be apt to learn whatever occupation he was placed at, and do it tidily and well. M. de Taeye said that "the success attained had been most encouraging, for while the system was only initiated in 1879 the pupils were already apt in applying the knowledge of drawing to practical purposes. They had found after the fourth year of study the pupil had a decided bias towards a particular vocation, and that when this bias was followed it was rare to find that a mistake had been made in the choice of a profession."

It is to be noticed that while the neighbourhood of Molenbeck is very poor £12,000 was ungrudgingly raised by the Commune for building this school. Its annual expenditure is £1,280. With such a preparation and thorough teaching it is not to be wondered at that the pupils of these evening drawing schools of Brussels have great facility.

The St. Josse school was inaugurated in 1862, and has 400 pupils, many of them attending the primary schools. The teaching is of the same practical character. Lectures are given on the elements of geometry, and the theory of perspective illustrated by explanations of the professor on the black-board, which are copied by the pupils. The classes are from 7 to 9 in the evening.

The drawing school of Ixelles occupies jointly with the communal elementary school a commodious building erected by the commune at a cost of £12,000. It has 230 pupils. Classes from 7 to 9 in the evenings, and the advanced classes are also taught on the Sunday mornings. Emulation is kept up in these schools by means of competitions which take place every three months. In Brussels the salaries of the teachers are very low. At St. Josse the nine teachers altogether only  
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received £160 per annum; the total budget of the school amounting to £760 for the tuition of 400 pupils every day of the week and on Sunday mornings.

Mechanical and architectural drawing are also carefully taught, the students beginning these subjects in the second year. It is an established rule that the students must draw well in outline by the freehand before they are allowed to use instruments. Special divisions are set apart for constructive drawing for trade purposes, and architects, builders, stonemasons, carpenters, joiners, &c., have special teaching suited to their respective trades, and draw from examples likely to be of service to them in their every-day work. In the third year original designs are made by the students. I examined some of these and found them highly creditable. Those students residing in the respective communes in which the schools are situated obtain their instruction free, but the non-resident can only be admitted on payment of from 18s. to £1 16s. per head per annum, which is done by the authorities of the commune to which the students belong. They provide their own materials, and usually begin by drawing geometrical forms on black-boards which surround the walls of the room. Thus rapidity and boldness of work are induced, and they quickly acquire sufficient power of drawing for the purpose of their respective trades.

In the apprentice and artisan schools drawing is made the most important subject, although the aim of these schools is to give the workman that scientific instruction which he cannot obtain in the workshop, and to procure for him the means of improving his material condition and of developing his intelligence; to take him away from the old rule-of-thumb method, and to increase the economic value of his labour, and thus place him in a position to contribute to increased production, not only for his own but for the national benefit. I shall have a great deal to say about these schools, as well as the industrial and professional schools, in treating of technical instruction in the second part of my report, but just here I will only say that they are all more or less drawing schools, as instruction in drawing is at the bottom of nearly all industrial teaching. M. Rombaut, in his report on industrial and professional education in Belgium, gives a graphic description of the peculiar method of teaching drawing adopted almost universally throughout Belgium in the evening schools. When the workman arrives at the school, his hands having been rendered clumsy by the coarse work which has occupied him during the day, it is first necessary to lead him to obtain delicacy of touch, while, at the same time, giving him exact ideas of dimensions. In order to do this, black-boards are in each class-room fixed against the walls, each pupil having placed before him a square metre of black-board surface. The teacher shows him how to draw with chalk, without the aid of any instrument, various forms of lines—straight, inclined, curved, and their various combinations. It is only when the workman has thoroughly acquainted himself with the idea of these lines by the use of chalk that he begins to draw with charcoal on paper. This instruction lasts about a year, being carried on every evening of the week, after which the pupil passes on to the study of projection and ornament. This leads him up to industrial drawing bearing on his special trade, as also to original designing and drawing to scale. The instruction is given at night after the termination of the day's work. The duration of each lesson is one hour, two hours being employed each evening, one hour of oral instruction always preceding the drawing lesson. The course lasts from three to five years, according to the locality and the importance of the subject. On Sundays the instruction is given throughout the morning. The last hour is generally devoted to



a lecture given in the form of a discussion which is opened to the public. These lectures include industrial economy, constitutional law, and hygiene. There are forty-five apprenticeship schools, thirty-one industrial schools, and four professional schools, besides many of a special character, such as the Antwerp Superior Institute of Commerce, the Hainaut Provincial School of Mines and Industries, &c.

The industrial and professional schools are essentially communal institutions ; the greatest autonomy is therefore left to the communes by the Government in the direction of these establishments. It is the communal authorities who appoint the teaching staff, decide as to the budget, and who elaborate the programmes of all regulations and courses—in short, they administer all the affairs of the school. The Government only reserves the right of approval of all budgets, programmes, rules and regulations, and the nominations made to the teaching staff. The Government is also represented in the administrative commissions by their inspector, who controls the working of these schools on account of the subsidies granted by the State, and to assist in the improvement and development of such useful institutions. These subsidies, which have been successively accorded since 1879 to advance technical education, have improved the situation of many of the schools, by ameliorations which were considered necessary. Thus it may be said that, in a general manner, a sensible progress has been realized since that period. The salaries of the staff, which were absolutely insufficient, have been arranged in a reasonable tariff, the teaching has been rendered more complete, and repairs and improvements made in the school buildings. The teaching materials and the collections of casts and models, which were very faulty, have been replaced and added to in a notable manner; the teaching of drawing has been entirely reorganized and placed upon a national basis, whilst theoretical teaching has been placed within reach of every workman. Libraries are beginning to spring up in the schools, many of which latter have been completely reorganized.

The industrial schools of Ghent, Antwerp, Liège, and Louvain are types of the excellent class of schools in the provinces that teach drawing in all its branches; therefore what I say of them may be applied to most of the others. Observers of facts, and amongst other things the progress of students in drawing in establishments that have precisely the same regulations, the same hours of study, the same class of students, all drawn from the artisan class, that while the progress made in one school is everything that could be desired, in others it is quite the contrary—so much depends on the teacher. Where an affinity, so to speak, is established between the teacher and pupil things go on well, but where this does not exist, no matter what the qualifications of the teacher may be, the reverse is universally the case. Therefore, in many of the provincial schools of Belgium, I have found great difference in the work of pupils under apparently the same circumstances, and indeed I have found this in every country I have visited; and it leads irresistably to the conclusion that pedagogy in art must be thoroughly studied, and that all teachers of drawing should be carefully and systematically trained to teach under the supervision of a professor who has that quality, among others, of identifying himself with the individual student.

I shall only describe here that section of the industrial school that teaches drawing. It carries on towards completion that which has been begun in the primary school, and, in order to be within the reach of all the working classes, the instruction is given in the evenings and on Sunday mornings. Drawing is taught  
entirely

entirely from *relief*, copying engravings, and working from the flat have been entirely banished; and, as I before stated, the pupils during the first year draw with chalk upon a blackboard, while in the second year they draw in outline geometrical figures and their combinations. They also learn projection, and by the end of the second year are able to draw detached pieces of machinery, such as bolts and nuts, pins heads of connecting rods, and other simple examples of engine work. In the third year all the mechanical drawing is done from the actual object. The student makes his own measurements and an outline sketch with dimensions thereon, from which he makes a finished drawing in plan, sections, and elevation. In explaining the system and work at Ghent, Mr. Rombaut informed me that the method had given the best and most beautiful results. The system never aimed at making draughtsmen, but that when the professor discovered among his pupils a student who had special aptitudes for drawing, then such an one could be encouraged to carry on his studies in a particular direction; but this is the exception. The rule and object of this method is, first of all, that the workman should be able to thoroughly understand a drawing of his work, to be able, if a piece of machinery be broken, to make such a sketch with dimensions that a proper drawing may be made from which the actual work can be carried out, and to be able to place any idea upon paper. Boys are received into these evening classes at the respective ages of twelve and fourteen, according to the locality, having passed an examination in reading, writing, and arithmetic. At Ghent, for example, where cotton-spinning, weaving, and dyeing are the principal industries, in the courses of industrial drawing they teach all the applications of art to the divers branches of industry, in which form constitutes an element of value, and not all the composition and execution of the various kinds of designs employed in manufacturing industry, such as designs for weaving with the Jacquard loom, designs for lace and for calico-printing. At the close of their studies the pupils should be able to execute commissions for designs for the manufacturers. In these drawing courses workmen are formed for the furniture, bronze, and ceramic industries, as well as for general decoration. This school was established in 1852, and until 1861 the drawing classes were held only in the day time; but from that time the professor was instructed to give, besides the ordinary day lessons, a course of ornamental drawing in the evening, where only young artisans were admitted who possessed a certain knowledge of academical designs.

To enter the special course of industrial art the pupils ought to be specially prepared. The course is not so effective as the courses of the academy, where the hours of study are much longer, while here the studies are only in the evening. It follows that many of the young men who would devote themselves to applied art, and who would commence their studies at the earliest possible moment, enter the school with too little knowledge of drawing. To obviate this inconvenience there was a preparatory course organised, in which, during two years, pupils completed their academical drawing. This permitted them to get completely through the courses of the school in four years. This course was confided at first to the care of an artist of great talent—Pierre Drovigne—and is now given by a gentleman who is an artist and a sculptor. He at the same time teaches modelling. The courses of the special section of industrial art being given in the day time numerous apprentices could not attend; therefore, to give these the opportunity of obtaining the desired instruction, the course of ornamental drawing is given in the evening.

A course of instruction in photography has been definitely introduced in the programme of studies, and is well attended. There

There is also a course of industrial drawing for young women. The instruction comprises ornamental drawing from the cast, study of fruit and flowers from nature, elementary drawing of the figure, studies of animals, composition and disposition of ornament in their application to textile fabrics, embroideries, carpets, lace, &c., and elementary designing generally. This school presents a good example of judicious organisation, and the results of its teaching have been in every way successful.

The same may be said of the Antwerp Industrial School, which was organized in 1866. It is an evening school for workmen who go through a definite course of instruction. Drawing is taught in its various applications; the teaching is free, and special attention is paid to it, the method of instruction being the one I have already described.

I visited the Industrial School of Liege, where I found the organization similar in most cases to the Ghent school. A new and commodious building has been erected for this school at a cost of £20,000. It contains excellent class-rooms for teaching drawing, as well as for chemistry, physics, and other purposes; museum for collections, library, rooms for teachers and director. The English Royal Commission, who visited this school in 1882, thought so highly of it that they appended drawings of it to their report. I reproduce them, as nothing could be better arranged as a model building for an industrial school. (*See Appendix.*)

The Liege Industrial School was founded and supported by the Municipality of Liege, its object being to instruct artizans and workmen in the great variety of industries which are carried on in the district. It is an exceedingly well-managed practical school. The classes are held in the evening, and comprise courses in free-hand and geometrical drawing, arithmetic, and geometry the first year; machine drawing, geometrical drawing, descriptive geometry, general physics and mechanics the second year; while in the third year the course comprises machine drawing, drawing for smiths and masons, joiners and carpenters, besides the other industrial subjects. There are 410 students. The students are very proficient in freehand drawing, chiefly attributable, in my opinion, to the teaching power of the professor, M. Thomas.

The Industrial School of Louvain is installed in the same building as the Academy of Fine Arts (*Académie des Beaux Arts*), and is placed under the same direction as that establishment. Although its creation has been so recent it has made excellent way, and may be considered one of the best examples of this kind of institution. The drawing classes are especially well organized, and the drawing very good. Instruction is given in freehand drawing, study from the cast, sketches of large models, ornamental figures, and drawings of the elements of machines, as well as the machines themselves. A new subject is given every week. All the students in the class work at the same model for a week, when it is expected that the drawing will be finished. The director is M. de Taeye, whose system of teaching I have described. I may add that with his own pupils the system is eminently successful. The instruction in drawing is carried on in five large and commodious rooms, formerly belonging to one of the old colleges of the University. Boys begin with geometrical lines on the blackboard, and proceed to geometrical curves. The elementary room has places for 140 pupils, with blackboard for each. It hangs by hooks on a rail in front of the student, and rests on his knees while he is drawing. In the second room the pupils were engaged shading from simple models. In the third room they were drawing simple models of architecture with charcoal and stump. In the fourth room more advanced students were at work on the cast and antique, while in the fifth

fifth they were doing finished work in shading. I noticed hanging in the various rooms some excellent examples of students' work in drawings of the human figure, and was informed that they were time drawings, and done in four hours. There were also some good designs for decorative and industrial purposes. I was informed that many of the students here continued their studies at Paris.

In Holland there is no national system of education. The law requires that there shall be sufficient schools to give primary instruction to all children. Teachers, however, are not graded, and any person of a good moral character may establish or give instruction in a primary or secondary school. The communal authorities are responsible for providing the schools for primary instruction, the Government contributing to the expense of maintaining these schools at the rate of 30 per cent. of the cost. Elementary schools are divided into two classes, ordinary and superior. Attendance is not compulsory, and about one-half of the school children pay no fees. The system is not perfect, but fairly satisfactory. The communes administer the elementary education by committees and local funds provided by subscription; and public opinion and public spirit have pressed forward and fostered good teaching and good schools. From one cause and another, although there are no compulsory measures for building schools or compulsory acts of parliament to secure attendance, there seems to be a sufficient number of good schools, and the percentage of children attending school is comparatively a very good one.

The lowest grade of elementary school is free, and the next—a grade higher—are also free to the poor who make application for a remission of the fees, but fees are charged to those who can afford to pay. The average fee is only a little over a penny a week. They are called five-cent schools, and, like all the other public schools, must be under inspection. The State education begins at 6 years of age, but most children attend infant schools or *kindergartens* at a much earlier age. Many of these infant schools are maintained by private patronage, but some are under the commune. Night classes are held, and attended by boys and girls after the age of twelve. In these schools they can continue their education.

In art matters there is at the Hague an Academy of Art, in which the classes are held in the daytime from 9 to 12 and from 2 to 4, and in the evening from 6.30 to 9.30. The day student pays a fee of 8 florins (13s. 4d. sterling) for six months—about sixpence per week, and the evening classes are free.

The students (400 in number) attend on three evenings a week. The classes are open every evening excepting Sundays, half of the students attending on alternate evenings. The school is well conducted, and the students enthusiastic in their work. Modelling in clay is also taught. There are a good many female students who attend the day classes, and some attend also in the evening. They are chiefly elementary teachers, qualifying for teaching drawing. Some of the work of the advanced students was very good, especially in the architectural classes.

A silver medal is annually awarded to the best drawing exhibited at the competition, which is retained by the school. A number of these prize drawings are on view, and they form an excellent means of judging of the artistic merits of the school, showing altogether the best work of a number of years.

There is an art library open to the students of the school. The school budget provided by the municipal authorities is about £835 (10,000 florins).

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The artizans' (*ambachts'*) schools are institutions founded by private enterprize for teaching the handicrafts. Pupils are admitted at 13 years of age. I shall say more in the second part of my Report as to their organization and management, and mention them here for the purpose of showing that they are largely the means of teaching industrial drawing, which forms an important part of the curriculum. It comprises linear, free-hand, ornamental, decorative drawing, modelling, architectural drawing, and drawing from nature. The course of instruction extends over three years.

The Dutch immediately after the Exhibition of 1851 recognized the necessity of teaching all workmen the use of the pencil in connection with the work he is engaged upon, as by its exercise he must be a more competent workman than if he knew nothing of drawing.

In Rotterdam I visited the *ambachts'* school, which was established in 1869. This school was erected by voluntary contributions, and commenced teaching in 1869. Drawing is carefully taught and made thoroughly practical. The system adopted in Belgium is pretty generally practised. The boys begin with copying rectilinear and curved figures, simple ornaments from the cast, &c. In the architectural course, as soon as they have acquired sufficient skill, the students are made to do practical work by drawing details of construction and in making drawings to scale from actual measured work. In the advanced classes they learn mechanical projection and simple perspective as applied to architectural details and parts of houses. The full course lasts three years. Altogether the work is not, generally speaking, of the high character I saw in some of the Belgium schools, but on the whole highly creditable and much in advance of the ordinary art school in many English large towns. The Dutch appear determined to thoroughly well ground their youth in art, have introduced its teaching into their elementary schools, and have opened, or are preparing to open evening classes at every place where an artizan population is to be found. They feel that in order to secure a permanent prosperity that the artizan must be educated in his calling, and that the nation whose artizans are the best artists and scientists must excel the others in industry and manufactures. The schools, therefore, must be good schools, not only for the sake of the individual but for that of the State.

In Germany education is compulsory, and nearly all classes of people are educated in the public elementary schools or the people's schools (*volksschulen*). Children enter these schools at the age of 6 and remain until they are 14. Those who intend to continue their education in a secondary school may go at first to a preparatory school, but these are the few. The system is not the same all over Germany, but generally the secondary schools consist of higher elementary and what may be termed the proper secondary school. The gymnasium, or what we term a grammar school, is the classical school; the real gymnasium, where the Greek language gives place to science, but where Latin is taught. The ober-real school, a commercial school in which no Latin or Greek is taught, modern languages, drawing, and science taking their place. In order to complete the course of instruction in either of these schools the pupil should leave the preparatory school at the age of 9, as it takes fully ten years to get through the course. Pupils from the gymnasium, which ranks as the highest secondary school, who have passed the examination and obtained the certificate can enter any of the faculties at the university or the polytechnic. The leaving certificate of the real gymnasium gives a right to the polytechnic school or the faculty of philosophy at the university, while the same class of certificate on leaving the ober-real school only qualifies for the polytechnic.

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Both elementary and secondary schools are under the supervision of the Government, and all teachers must be certificated. The elementary schools are supported by the municipality, except in those which are very poor, where the State assists. There is no fixed rule or law respecting secondary schools, but generally they are carried on by the municipal authorities. In some cases the building only is furnished; in others the State provides the cost of maintenance. Sometimes the whole cost is borne by the State; and again in others by the province. Primary education is generally gratuitous, and the fees for secondary teaching are always very low. Where parents are too poor to pay fees they are remitted both for primary and secondary education, so that instruction of the best kind is absolutely within reach of the poorest.

This also may be said of the industrial schools, where a good commercial education is provided. Modern languages are taught instead of classics, with excellent courses of chemistry, drawing, and manual work in the workshop. It is, however, with the industrial art schools I have to treat at present, so far as drawing is concerned, and the system of teaching, which has undergone great alterations within the last few years. In the first place, drawing is taught in all the elementary schools, in the continuation schools (at which in many parts of Germany attendance is compulsory, and at which drawing is chiefly taught in its various applications to the trades), the *Handwerker Schule* (a purely technical evening drawing school), and numberless evening and Sunday classes. Evening technical instruction, chiefly in drawing and its applications, occupies a most important position in Germany, and drawing is recognised as the foundation of technical instruction, and treated accordingly. The English Royal Commission visited Germany in 1882, and they report of the evening classes as follows:—"In forming any estimate of the school system of Germany, the Commissioners believe that great importance must be attached to the influence of the evening and Sunday schools, which in many States train large numbers of young persons leaving the primary school at 13 for an additional period of from three to four years. Drawing, together with the ordinary elementary school subjects, is mainly taught, and great care is taken to make the instruction of a kind suitable for the young workman. In South Germany the continuation schools are sometimes simply drawing schools with special application to various handicrafts. In some parts of Germany attendance at these schools is compulsory. In addition to the State schools, there are schools provided by powerful associations of workmen, in which instruction is given on week-day evenings and on Sundays, including literature, drawing, and elementary science. As examples of the latter organizations, we give an outline of the Berlin Artizans' Society (*Handwerker Verein*), and a short account of the German Association for the Diffusion of Popular Education, which has its headquarters in Berlin, but possesses branches in all parts of Germany.

The Berlin Artizans' Society was founded in 1859 in order to encourage among its members general culture, sound knowledge of their callings, and good manners—*gute sitten*. For this purpose lectures, conferences, a library and a reading-room, classes for the promotion of general and technical instruction, as also for gymnastics and for singing, together with amusements in which all members, together with their families, can participate, are provided. Any youth on attaining the age of 17 may become a member if he presents testimonials of good character, and is duly introduced by a member. The number of ordinary members in 1882 was 2,246. During the year 137 lectures were given by fifty-four lecturers, who  
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are members of the society, on the following subjects:—Technology, trade, commerce, and political economy, literature and art, history and geography, natural history, hygiene, popular education, jurisprudence, and history of civilization. There are also classes in book-keeping by single and double entry, mercantile arithmetic, English, French, drawing, singing, and shorthand writing. Adults pay 4d. per month for instruction, and youths and apprentices 3d. The instructors mostly give their services gratuitously.

There are three evenings devoted to declamations, in which regular facts are assumed. Many meetings are set apart for free discussion on social questions. At the close of all lectures the audience are invited to ask questions on any points not clear to them. Frequently on Saturday evenings there are social gatherings of the members and their families, in which the band and choir take part.

The public lectures of the *Handwerker Verein* are delivered by men of the highest eminence in literature and social science, and form one of the striking features of interest in the Berlin winter season. The addresses of the late Dr. Lasker were attended by all the most remarkable persons of Berlin society. Grants to the society's funds were received from the municipal authorities and from the Education Minister of £50 and £25 respectively. Summer excursions, visits to places of public entertainment at reduced charges, children's gatherings, and opportunities for recreation as well as instruction for the members, are largely provided. There is an important building trades' school connected with the society. It is purely a winter school. The instruction commences on the 31st October, and ends on the 29th March following. There were in all seventy-nine students, who were distributed over the full course of three winter semesters as follows:—Forty of the first year, twenty-eight of the second, and eleven of the third year.

To the cost of the building trades' school the Minister of Public Instruction contributed £255, the municipality £125, and £50 was received from the Wever bequest; the school fees and entrance-money amounted to £403. Among the members of this flourishing society were 148 carpenters, 131 tailors, 95 locksmiths, 82 masons, 75 bookbinders, and 681 commercial and other clerks. The expenditure for the year was about £1,500.

"The Association for the Diffusion of Popular Education aims to encourage the discussion of questions relating to free popular education at public meetings conducted by the society, to aid the formation and support of societies having similar aims, to assist in the creation of continuation schools, libraries, reading rooms, &c.; to aid in obtaining teachers and in providing lectures; the issue of a journal and of publications bearing on public instruction; the employment of travelling instructors," &c. It has between 5,000 and 6,000 members, and some 750 affiliated societies. These branch societies appear to do much excellent work. Thus the Frankfort-on-the-Main society reports that the continuation school in connection with the association had between 500 and 600 scholars, the classes comprising German, English, French, arithmetic, bookkeeping, writing, and drawing.

The teaching of drawing has undergone considerable change within the last few years, chiefly owing to the admirable teaching of M. Jessen. This became so remarkable that the Government has adopted it to a large extent, and the method is certainly worthy of being profoundly studied by all teachers of drawing.

Twenty years ago, M. Jessen, a civil engineer of Hamburg, established, at his own expense, a special school wherein to experiment with a new method of teaching the rudiments of drawing. The first trials were so extraordinarily successful that the municipal authorities of Hamburg took the matter into their own hands, and voted for its maintenance £3,500 (70,000 marks) annually. This went on until 1875, when, on account of the ever increasing number of pupils, the municipality erected an immense edifice for the school, and its annexed museum, costing £150,000 (3,000,000 marks), and at the present time the number of pupils amount to considerably over 2,000. In 1881 the municipality appointed M. Jessen director of all municipal schools in order to bring them all under his system of working. The town voted for this purpose £2,000 (40,000 marks), to which the state added a sum of £900 (18,000 marks).

The system of M. Jessen appears to consist less in the innovation of any new scientific method of teaching the principles of drawing than in the natural organization of the school towards giving the pupil, individually, that particular and special instruction which the necessity of his trade or profession requires. The time of study is not fixed, and the pupils stay at school three, four, or five years, according to their aptitude for acquiring the necessary instruction. Often the very intelligent ones obtain proficiency in two years. All the courses take place in the evening. The first half of the first year is exclusively consecrated to the study of the primary elements of drawing, such as are generally taught in all schools; but drawing from the flat is absolutely forbidden, and everything done from objects. In the second half professional drawing is commenced, and as soon as the pupil really knows how to draw, his work is chiefly confined to models which apply to his particular profession. In the following years the professional work and general artistic work is about equally divided, and one day in the week the work is exclusively professional, under the direction of a working foreman. Sometimes this class is held at the school to teach general principles, and at other times in private workshops to teach the application of those principles. Private workshops have to be used, as the Government have not yet organized any manual professional schools.

Perhaps the great singularity of this method is that the pupils do not receive their instruction in class, but each one individually receives a personal intimate instruction, varied according to his temperament and aptitudes. The professor is always in attendance in the school; he inspects continually the work of the pupils, giving them judicious counsel and reasoning with them; in short, he follows step by step the work of each student placed under his direction.

The tuition at these schools is not gratuitous, nor is it thought that gratuitous teaching would conduce to any greater success. The authorities think that a small contribution by students or their parents serve to interest them in the work, keeping them up to the mark, and the sum charged is about the same as that charged by the Board of Technical Education in Sydney, viz., for eight lessons of 1 hour per week, 6 marks (6s.) per *semestre*; 12 hours, 9 marks (9s.); and for 16 hours or more, 12 marks, which is the highest rate of payment.

These courses of professional teaching aim to give, during the leisure time of the workmen and apprentices, the art of drawing and the science necessary to enable them to practice their trade or profession with success, and they are not admitted to these courses until they have passed the age of 13 or the age determined by law (*age scolaire*) for primary instruction. There is no examination, but it is necessary for students to bring a certificate that they have received the necessary primary education.



These courses take place during the week from 7 to 9, and on Tuesdays and Fridays from 5 to 9 o'clock, and on the Sunday from 8 to 12 o'clock a.m. The *semestre* equals twenty weeks.

The choice of subjects appertains to the students, who have to show that they know something of its nature, so that there is every likelihood of their following the trade with success. The subjects of the courses and of the practical work are as follows:—Freehand drawing, mechanical drawing, descriptive geometry, professional drawing for cabinet-makers, turners, tinmen, lock-makers, carpenters and builders, opticians, goldsmiths, engravers, masons and stone-cutters, sculptors, painters, lithographers, carpet-makers, modellers in clay and wax, decorative painting, mathematics, mechanics, physics, chemistry, arithmetic and book-keeping.

Regularity is kept with the greatest care, in accordance with that of the primary schools, and at the end of each *semestre* certificates are issued. If a student should be too poor to pay the charges the administrator is empowered to give places in the school gratuitously. An exhibition of the students takes place in April of each year.

The outline of the system, as taught by Dr. A. Stuhlmann, of the General Industrial and Builders' School (*Allgemeinen Gewerbeschule und der Schule für Bauhandwerker*) in Hamburg, is as follows:—The instruction extends over nine years, in three courses of three years each. It is arranged that pupils should commence at 6 years of age by drawing simple forms on squared paper. This form of commencement exercises the hand, develops perceptive power, communicates the intelligence necessary to elementary designs, and enlivens the powers of imagination. The aim of this work is to obtain a certain knowledge and true perception in the representation of that class of designs which fit into a net-work of squares, and in the completion of partly drawn symmetric designs; also to be able to draw elementary forms from memory, and to make changes from one geometrical form to the other.

This teaching comprises:—(1) perpendicular lines of various lengths; (2) perpendicular and horizontal lines; (3) perpendicular, horizontal, and diagonal lines; (4) a variety of squares, stars, &c., whose component elements can be explained by the teacher; and (5) curvilinear designs.

All these designs are partly or wholly drawn by the teacher on a square-lined black-board, or they may be only verbally described. The pupils draw the perpendicular lines on squared red-lined slates, and in the succeeding practice upon squared blue-lined exercise books, and later on using exercise books with points instead of lines.

Instructions are also to be given in class three times weekly for an hour each time. Half-an-hour in the summer months, about once a fortnight, should be devoted to exercises in distinguishing and naming the various colours, according to their different shades, brilliancy, and purity. By these means colour blindness is at once detected, and such pupils in the future can be restricted to monochrome. These various courses extend over three years when the middle courses follow, for which it is arranged that as nearly as possible the pupils shall be of from 9 to 12 years of age. These courses comprise freehand drawing of flat forms for the purpose of cultivating a disposition to comprehend and grasp the subjects of level and flat design in the improvement and stimulation of the imaginative faculties. The aim here is to secure accuracy in perception and the correct rendering of the outlines

outlines of level forms and shapes, to this is added the completion of partly given designs, drawing from memory, changing and inventing more complicated forms. Then follows the introduction to object drawing, and the designing of decorative and arabesque forms. The pupils begin with straight-line forms and the filling in of square spaces, curved ornamental designs, with others in relief in light and shade outlines of more difficult figures, the pupils copying from the dotted black-board, on which the teacher draws the design, to their books dotted in the same manner on a smaller scale. Afterwards they draw from models hung on the walls, and later on from the objects themselves. The exercise books are of the common kind, and Faber's black-lead pencils No. 2 for outlying and No. 3 for finishing. They are also allowed a strip of paper with which to correct the lines.

After this the advanced pupils draw from the wooden models. The teaching is first given in class, and afterwards individually. One hour is at first given twice a week, and afterwards two hours once a week during the summer season to exercises in a practical exposition and explanation of coloured objects in a direct light, also in a reflected light and in the shade.

The third series, or course, where all the pupils are advanced, and from 12 to 15 years of age, is devoted to the freehand drawing of objects, having for its aim firmness in the true and exact rendering of the outline, and the light and shade of plain solid objects.

The instruction consists in drawing: (1) smooth and level objects; (2) the front view of smooth cylindrical objects; (3) the side view of these objects; (4) objects with curved surfaces; (5) drawing from plain casts and shading. The backward pupils still draw from the board, as at the beginning, and all instruction is given individually, two hours once a week. In girls' schools one hour weekly is given for the drawing of patterns, and in summer-time half-an-hour fortnightly in exercises for judging and examining coloured patterns, with a view to their æsthetic effect. In the boys' schools there should be an hour weekly devoted to the sketching of arabesque patterns from natural plants; and the girls should do this, with the view of applying their work to lace patterns, embroideries, &c.

The instruction in the drawing classes in the primary and industrial schools is a methodically-arranged course, and consists (1) in teaching the foundation of the system; (2) the drawing of flat designs on square-lined paper; (3) freehand drawing of designs; (4) the freehand drawing of objects; and (5) the drawing and projecting embroidery and other patterns.

This system has found a great many partizans in Germany and other countries. In Sweden it has been introduced into all the primary schools, teachers' training colleges, and high schools. Dr. Stuhlmann's practical handbooks, explaining the system, have been translated into the Swedish language for the use of these schools.

The value of drawing is exemplified by the fact that bodies occupying space can be more easily drawn than described; and further, that the drawing is far more comprehensible than the most elaborate and painstaking description can possibly be; that the language of drawing is universal—and this insures to drawing the high importance it holds, not only in the arts and manufactures, but also as a means of general culture.

This importance is also enhanced by the training it gives to the eye, the improvement of taste as regards the sense of the beautiful in form, and the greater liveliness it imparts to the imagination.

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The object of teaching drawing has been generally regarded as simply improving the disposition, to comprehend, expose, and invent different forms; but as to how far this education should be carried, there exists the most different opinions. While on the one hand too little is demanded, on the other the aim is placed too high both in a mathematical as well as an artistical direction.

Opinions differ at present more than ever on the practical methods of teaching. To individual instruction is opposed class instruction; and in many instances customary drawing from models is cast aside for copying from engravings or from the board.

The aim of Dr. Stuhlmann's handbooks is not to enter into the details of the different systems, but to give a comprehensive and detailed exposition of the methods of teaching, which has already gained a vast number of supporters.

Before proceeding to explain the system, the aim and scope of teaching in the school has to be considered more closely, and suitable means sought to carry it into effect. The draftsman wants to call forth from the spectator the same representation or conception of the subject which he has himself conceived of the body he has designed. This representation or conception the draftsman must necessarily possess before he can draw it,—

- (1.) From his acquired knowledge of the subject.
- (2.) Through the exertion of his imaginative and inventive faculties, and
- (3.) Through systematic reflection in the way of geometrical construction.

For the first of these cases he must be able to grasp the visible or the described objects with sufficient lucidity, in the other case he must have enough versatility, in changing and making conformable the elements of form; and in the last more or less fundamental knowledge of the laws of geometry, and the capacity for their application. However, as these cases seldom appear singly, but nearly always in a variety of combinations, the draftsman cannot entirely succeed without the qualifications and knowledge above referred to. It is not less clear that these capacities when combined act far more effectively than when single, therefore the purity of production depends essentially not only on the degree of accomplishment in each branch, but in a greater degree on the combined performance of the whole.

The education of the perceptive faculty being so important, the great question is, how is it to be obtained in the best and surest manner. The fundamental point demanded pedagogically is to combine everywhere the productive with the receptive faculty, the pupil must grasp what is offered to him mentally and reproduce it after putting the object aside.

The teaching of drawing has two different aims—to reproduce (1) a given form or shape, and (2) an invented form by the designer.

The school instruction in drawing natural objects is limited, to the school building, its contents and surroundings, notwithstanding this local limit the material is so plentiful and various that only a small portion of it can be made use of. The scholars whom we may expect to be able to draw the school building and surroundings (say from the garden) are comparatively few. It is far easier to instruct an advanced pupil to make a drawing of a neighbouring house, a fountain, a tree, or other object so far as it may be seen through the window. On the contrary it is the part of a good instructor to lead all those pupils who are not too slow to draw a part of the classroom, together with its plain furniture and other objects in it, and to do this without many faults in regard to perspective. Advanced pupils may try living plants with large plain leaves.

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Although shading consists in the reproduction of the light thrown on the objects, the exercises must not be altogether confined to the comparison of the different degrees of light and shade, but the exercises should tend as far as possible to the accuracy of the whole design.

To enable the intuitive faculty of the pupil to properly understand the light and shade, he cannot be expected, nor should he be allowed, to draw the objects within his reach promiscuously or without regularity. Transparent objects must be preceded by those which do not transmit light. Strongly shining objects should be used after those which do not reflect light; these should be without polish and light coloured. Exercises with angular and more or less geometrical forms must be drawn before the pupil is allowed to try his hand on circular or curved work. There is little use in copying finished drawings for instruction in light and shade. The explanation must be made while the model is before the pupils, and although in no school can the artistic finish of a drawing be unnoticed, the spare time allotted to class work should not be wasted on any particular manner of execution. The pupil in the first instance must be kept to reproduce with fidelity the appearance he has understood, and only the one who has done so with confidence, can successfully be lead forwards to the more advanced art of finishing.

The truly artistic method of drawing, which with few bold line strike the characteristic appearance of the object, require far less time and trouble than the laboured minute finish by stippling; but to do the first it is necessary to possess the required artistic skill.

It would be unjust to force a pupil to any particular manner the execution of which he is not able to appreciate; while on the other hand it would be preposterous to expect him without assistance to find out its merits and advantages. It is for the master at the proper time to instruct the pupil of these advantages or demerits in following, either one or the other method, in order to attain the desired result.

The subject should, in every way, be well adapted to the pupil's standard of knowledge. The more this is studied the better the scholar will appropriate the instruction given him. The selection of a subject by the teacher is easier when the boys of a class are fairly equal in elementary knowledge. A more even degree is obtainable through having many succeeding grades of classes. Equality, however, is not even then to be attained. It is only by individual teaching that it is possible to give every pupil an adequate task to perform, answering exactly to his requirements, and which he is convinced at the outset, by the exertion of all his faculties, he can master without outside assistance. The more this succeeds with individuals, the more time has the teacher to employ the boys usefully.

The individual instruction which is carried on successfully, permits us to take into particular consideration every boy's capacity; this is a most weighty circumstance, because in drawing solid objects the clearness and liveliness of the perceptive powers, the accuracy of the eye, and dexterity of hand, must be brought out, these qualities are very important and are found to differ exceedingly in different boys; by individual treatment those in every way naturally gifted need not be held back, while the weakest need not be dragged along, in order that the medium forming the majority should not suffer.

The laws of form and proportion comprising the main features of the model must in the first place be gauged by the pupils without assistance. The frequent faults occurring in these exercises can only be properly rectified by immediate measurement

measurement before the eyes of the pupil. A verbal admonition is not sufficiently convincing to him, and therefore not nearly so effective. Yet it is absolutely necessary to train children to work with accuracy from the commencement of free-hand drawing, and control being easier on account of the simplicity of figures careful work can be insisted upon. In many cases the accuracy of the work cannot be clearly explained by the teacher without ultimate measurement with a strip of paper. The teacher who will not allow these means to be used has to ask the pupil to rely on this sight measurement only, without more convincing proofs than moral confidence. In that case he must always be present to see that no measurement takes place behind his back, and that the pupils do not ultimately make the discovery that the master's eye has proved inaccurate for once.

It is, therefore, advisable to allow measurements to be taken until the sight-gauge has sufficiently developed, a thing which comes to some sooner than others, but by all sooner or later, if the master only strictly insists that measurement shall only be resorted to after careful determination by sight. By proceeding in this manner the pupil will not only acquire the habit to work with precision, and to satisfy himself with a fair performance, but he will be tolerably secure against the disheartening necessity to cast aside a finished work through an error made at the commencement. This officially recommended measurement has many adversaries, not because it is in itself objectionable, but because it leads to abuse. It is contended that if the pupil is allowed to measure what he has done by sight, he will no longer be anxious to determine with the necessary carefulness with the eye alone, or eye measurement may be dropped altogether. The reply to this is: (1) The teacher will know how to prevent this abuse, as well as, for instance, that of straight lines being drawn with a ruler instead of the freehand. (2) Any method of teaching, rightly employed, has nothing misleading in itself, and should not be excluded on account of its possible abuse. If this were school law, how many things would have to be excluded from school. For example, the home lessons of the school-boy are equally liable to be done by somebody else. Moreover, if there is a foundation for belief that deceit is practised, which could not be prevented in any other way, the pupils should be prohibited at all times using measurements; but then the teacher himself must, in all cases, measure where necessary, in order to convince. Besides all this, pupils have very much gratification at seeing their sight measurements gradually become more accurate through continued exercise of free gauging, and the teacher will invariably find that the pupils gain in self-reliance in the direct proportion their perceptive powers gain in precision.

I find that in Germany, as in Belgium, the great aim is not so much to form industrial artists, professional designers, and professors of drawing, as to give to all the working-classes that special instruction in drawing and professional knowledge which cannot fail to improve them as artizans and workmen. It is to this great end the systems of M. De Taeye and Jessen are directing the minds of the greater part of their pupils. When, however, exceptional talent is recognised the pupil is encouraged to persevere in the direction to which his talents point. As observed by Professor Walter Smith in England, it is impossible for extraordinary talent to be overlooked when all are taught drawing, and while the instruction given does not make all pupils, designers, it cannot fail to make them better workmen. Mr. Philbrick's experience is that when drawing is properly taught it will be acknowledged by every enlightened mind to be an indispensable element in the education of every human being, whatever may be his destination in life. Here general education and technical education coincides. The child needs drawing whether he be destined for a course of liberal culture, or for any industrial pursuit. The

The Berlin Industrial Art School (*Kunstgewerbe-Schule*) is a combination of art school, normal school, and industrial museum, something after the model of South Kensington. Her Imperial Highness the Crown Princess of Germany who has invariably shown the greatest interest in and most assiduously promoted everything relating to art, whether pure or applied, has endeavoured to carry out here the initiative of her illustrious father, the late lamented Prince Consort of England. The institution is an admirable one and worthy of being taken as a model of what a combined industrial art school and museum should be. The building is a very handsome one, built of brick and terra-cotta in the Hellenic-Renaissance style. It is detached on all sides with uninterrupted light, and excellently arranged class and lecture rooms, with accommodation for 800 students. The school was originally founded by a private society and is now supported by the State. About one-fourth of the teaching expenses are supplied, the remaining three-fourths by the State. The museum has been formed to suit the trade requirements of Berlin. In pottery, glass, and metal work it is exceedingly rich. The arrangement is very similar to South Kensington.

The school is divided into day and night classes, but, as at South Kensington, most of the students attend both. Those who attend the night classes only do work of an elementary character. The professors, masters, and teachers, are forty in number,—twenty for the day classes, and twenty for the evening classes. They are appointed specially on account of their attainments as teachers, and their capabilities in the several departments of technical art.

The whole system of instruction is under the superintendence of a director, from whose decision there is no appeal, and who is never interfered with in his professional work, as he is the only responsible person to the Minister for Instruction for the success or otherwise of the school. The director of this school is also the director of the Normal Schools for the training of teachers (*Kunstschulen*). The school year is divided into two sessions, summer and winter. The fees for attending all classes during these sessions would be £3 12s. (72 marks) for the summer session, and £1 16s. (36 marks) for the winter session. The school year consists of nine months. The director can expend the school budget in any way he thinks best for the success of the school. The museum is always available to the students who are entitled to study within the museum or library. The museum is under a director assisted by two assistant directors. The schools are specially for instruction in industrial art as no pupils are admitted unless they intend to become trade designers, or otherwise engaged in occupations in which applied art is one of the leading elements. Both male and female students are eligible for admission to the classes.

Professor G. Ewald, the director, gave me every possible information, and personally conducted me over the school, making me thoroughly conversant with the method of working the school, and the many excellencies of the management. The male and female pupils work together in all the ordinary classes. From the number of drawings which the students have to make—charcoal and stump—there is no time for loitering and gossiping. The greatest interest is taken by the teachers in all the work of their pupils. They are always with the pupils to advise, correct, and teach. Order and discipline are most excellent, and steady, hard work is observed everywhere, both from the male and female students. Men are only admitted to work in the studios of the professors, excepting in the one devoted to textile fabrics. Here the pupils are mostly women. The hours of study are from 8 till 12 o'clock in the morning, and from 1 to 4 o'clock in the afternoon. The evening classes are from 5.30 to 7.30, and from 7.30 to 9.

The

The system, as described to me by Professor Ewald, is as follows :—On entering all the classes work from Jacobstat's copies, which are arranged in a most systematic manner in order to allow of a gradual development of the student's power. They are divided into frets mouldings, inclusive of the volutes of the Greek and Ionic orders of architecture, authenicons, scroll *renaissance* ornament, principally Italian and naturalistic foliage. These, again, are subdivided into frets, single, double, and triple; mouldings, painted and sculptured; authenicons of the single unib; then a combination, as on the hypotrachelium of the columns of the Eretheum; and then flat combinations of several forming a design; Roman scrolls, *renaissance intarsia* patterns, some copied from Meurér's examples of the choir stalls of the Church of St. Maria in Oscagna, in Verona, care being taken by the teacher to explain thoroughly the treatment of the acaultices foliation and the contrast between the work of this period and that of the Greek and Roman; then the more ornate style, where animal and figure form are introduced, naturalistic foliage, flat treatment of such plants and shrubs as the acanthus and laurel; then sculptured treatments of the same.

After the second copy of Greek frets has been made, the pupil must do at home either a memory study of one of them or a design combining the principles already learnt. Thus, at any early period his future as a designer is kept in view. Prizes to a small amount are offered for the best drawings. Tinting is also insisted upon, especially if the student intends to become a decorator or lithographer; and here also is seen a great advantage in commencing with the fret. The tint is laid on with one stroke of the brush, the various changes of direction of line enabling the students to get over the difficulty of flat-washing. No retouching or stippling is allowed.

The next step is to draw from the simple casts, mostly of *renaissance* details and special forms of ornament, designed by the teacher, in a firm and vigorous outline, some using the brush, others the charcoal and chalk point. All drawings had to be larger or smaller than the example. The student had to supply any defect in the cast, and could introduce slight shading if it assisted in giving expression. Throughout the whole system of the work the pupils are instructed to endeavour to make the drawings look nice. To assist them in this, good examples done by the teacher, or published under the direction of the director, treating the same or similar casts, are shown them.

This is precisely the same as is now carried out in many of the national art schools in France. The Company Quentin have published a series of reproductions of charcoal studies by Jean Paul Laurens, to show the pupils in drawing from the plaster how a master treats the subject. Of course the pupils are not permitted to copy these reproductions, or even to look at them when they are at work. The reproduction can be seen, its technique studied and imitated by the student. He has then an idea of what his work should be, if done well when drawing from the model, and is far more likely to make his work look well than he would if he had not seen how a master had treated it. Designs have also to be done at home introducing the details learnt in the class.

Shading of simple forms, such as prisms and casts of high relief ornament is the next stage. The forms used in the classes had been designed by the director, then modelled and cast in the schools. Figs. 1, 2, 3, 4, and 5 represent some of these forms

forms and the order in which they are studied by the pupils. The shading throughout every department of the school is done on gray paper, this being the half tone, the broad shades drawn by the stump, the high lights being put in with the chalk point or Chinese white, the dark shadows with black chalk or Conté crayon. The reason for using the tinted paper in preference to the white is this; Tempera painting is largely done, the method adopted being in the first place an uniform flat tint, equal in depth to the prevailing half tone, is put over the whole surface of the drawing. When this is dry the shades are put in the deepest part of the shadows, and highest lights coming last. As this kind of decoration is much used, students are accustomed from the beginning to work in this manner so that they may the more readily acquire the facility necessary for actual decoration.

It will be seen from the illustration that the objects and casts are simple in character, and the teacher is careful and particular in explaining the necessity of giving broad planes of light and shade. The cylinder is first studied as an object of many sides, where the gradations of shade are easily seen, and in shading even from the perfect sphere the forms of these gradations are drawn first. Professor Ewald attaches the greatest importance to this method of shading, which is carried thoroughly out in all the departments, life, antique, and still-life painting.

Antique and life study come next, and excepting the architectural pupils all are obliged to pass this course which forms the longest and most important period of study. The time of study is, for the antique from 4 to 7 and from the life from 7 to 9.30 on four days in the week, the fifth being devoted to practical and theoretical anatomy. In the studio of the decorative figure class a living model, usually a female, is posed, and rapid time sketches made, to be afterwards adapted to a design. The drawings as in the other classes are done on gray paper. In the general classroom the highest credit is given to those who treat the subject in a large manner, expressing in the best manner its action and pose. The life model here is always male. When a study is particularly good the teacher suggests an adaptation, the study being placed side by side with the adaptation when submitted to the director. Some students work in the outline only, in the style of Durer, others, and these more generally, shading on gray paper. Before the pupils commence drawing the teacher gives an explanation of the proportion, pose, and character of the model, illustrating his remarks on the black-board. Where the long bones of the limbs were sub-cutaneous, special reference would be made to the form in these parts.

All the arrangements of the life school are excellent. Forty students can sit to work. These seats are fixed, so there is no time lost in adjusting places. Anatomy is taught in this room one day in each week. Lectures are given, and bones, ligaments, muscles, and tendons, &c., are studied. Before each lecture students are required to make drawings of what they heard at the previous one, and submit them to the teacher. Life-size drawings, with the lengths of the principal long bones of the extremities, and groups of bones marked, were drawn in oil colour upon a black-board in three positions—front, side, and back. The teacher explained from these drawings and the skeletons, pupils making notes. All the drawings are done life size from actual measurement of the bones. In teaching the muscles the pupils had to come with drawings inked in similar to those upon the black-board, and to a proportionate scale. The teacher explained the origin, insertion, and use of muscle, then made a drawing of it upon the black-board in red chalk over the bones previously drawn there, the pupil carefully following upon his own drawing. This excellent mode of teaching has answered admirably, the pupils greatly profiting by it, as is well shown in their life studies. Most



Most of the pupils have a knowledge of elementary perspective, and lectures on advanced perspective are given, which all students must attend. The method of teaching is the one used by architects. Students of decorative art, furniture designers, iron workers, figure decorators, and architectural subjects are expected to follow this course most thoroughly. It consists of some twenty lectures, and large objects and subjects, sideboards, book-cases, flights of steps, arches, interiors, &c., were drawn in perspective, the system of using small objects, such as are used at South Kensington, being condemned as impracticable. The drawings are always done to scale, and the advanced students often made measurement drawings of suitable subjects selected by the professor; thus the student understood the actual shape and the appearance of the object at the same time.

Sciography formed a portion of this course, and was most excellently taught. Modellers, applied relief designers, decorators, and architects made very elaborate studies in this department. The tinting is done by a series of flat washes, commencing with the lightest, no softening with a water brush being allowed. The gradation, as spoken of with respect to figure drawing of rounded form, is invariably done in this school by flat washes, the greatest care being taken by the teacher to explain the true shape of the most subtle tint either on a sphere or a vase.

It is a rule in this school that should the pupils not have determined upon their trade after two years' study, it is compulsory for them to decide and to inform the director, as they are not permitted to remain longer at school without making known their decision. If the pupil desires to be trained as an artist or sculptor, instead of a designer for trade purposes, he must leave and join the academy schools. The line of demarcation between the school of fine art and a school to train designers has been here always strongly marked, although for my part I cannot see so much difference, for in studying, the antique and the living model are at all events good studies for both sculptor and artist. In addition to the subjects already mentioned, many of the younger pupils draw in sepia large-sized studies, and painted in a manner suitable for decorative work. Still life groups are arranged for compositions in colour. These groups are arranged in festoons and bouquets, and would always be useful to the decorative artist as a scheme of colour. Some paint in oil, but the pupils chiefly use water-colour or tempera. Directness of aim and precision of touch are the primary considerations with the professor, and no retouching or stippling is allowed. All work is timed in the advanced classes, which, I think, a most excellent plan, and one indeed which is almost of general use on the Continent. The decorative artist must know exactly where to put in his highest lights and deepest shadows, and to do this rapidly teaches him to do it firmly and well. All the studies made in the schools must be submitted to the director, who thus identifies himself with the whole of the school teaching. Marks are given for the work, and at the end of the year are all added together, so as to show the position of the pupil with reference to a scholarship. These scholarships are worth about £4 a month, and are reserved for poor pupils.

The students are requested to attend courses of lectures upon the history of art and the principles of design. Professor Lessing is an excellent lecturer, and his lectures of a most practical character. His system is to take some feature of decorative art, say "panels" for example, then to treat of their distinctive character, shapes, and chronological groups, illustrating the subject with drawings on the black-board, photographs, and printed examples. The pupils take copious notes and copy the lecturer's sketches on the black-board. After the lecture these notes are submitted for inspection, the teacher criticising and giving advice thereon. The

The arrangements of this school leave little to be desired, and the class-rooms and ateliers of the architectural, decorative art, life school, chasing and engraving, copper plate engraving and etching and modelling courses, are in every way commodious and well lighted. Mr. J. A. Pearce, a gold medallist of South Kensington, who was at Berlin studying at the Kunstgewerbe school while I was there, has furnished a report thereon for the South Kensington authorities. I append it to this report, as it is full of valuable information. (See Appendix). In Mr. Pearce's opinion the most important element, and no doubt the principal cause of success of the wedding of art to trade in Germany by the Kunstgewerbe schools, lies in having technical professors, the best in the country, to teach in the schools. These professors are men of recognized ability in the several departments of trade art, architects, engineers, ornamental and figure decorators, modellers, &c., well known throughout the country as being at the head of their several professions, and are thus able not only to give thorough practical teaching, but to assist in getting employment for their pupils. Generally their experience in the matter of design has not been confined to a knowledge of German art, but from a large acquaintance, by the means of personal study extending over several years, of similar work in France and Italy. Their salaries range from £150 to £300 a year, according to the importance of the subject taught. A studio, with appropriate fittings for private work and an adjoining atelier for pupils, are also given them. They are supposed to be present daily. The director holds them responsible for the students' work, though he does not in any way interfere, and it may happen that the whole time of the pupil is occupied by doing private work of the professor, providing the director's approval has been previously obtained. Employment is always found for the pupil during the three months vacation by either the professor or through his personal influence with the manufacturers, or by the manufacturers applying to the school, or by the director. The careful pupil is thus able to provide sufficient money during this period of practical work to keep him the remaining months of the year, supposing he is not in receipt of scholarship allowance. In the vacation of the year 1884 the pupils of Professor Schaller were occupied in assisting him in the decoration of the theatre at Leipsic. The year previous the advanced ones were sent to Verona to copy some frescoes, also for the professor. The instances, unfortunately so very common in our own country, of seeing the skilled and trained designer, after being educated in the Government schools, not able to get employment and obliged to turn to picture painting are unknown.

The Kunst school is a training school for teachers, and entirely a State institution. Before the Kunstgewerbe school was built it was attached to the Berlin Academy. Its entire system of teaching is adapted to the training of teachers of drawing. Admissions are limited to students who intend to make teaching a profession.

The system pursued is as follows:—Elementary—To copy from the black-board diagrams illustrating the principles of ornamental construction. As soon as the pupils can draw sufficiently well they have to draw them on the black-board before the teacher, at the same time giving such verbal explanations as they would use in teaching a class. The pupils have to submit from eight to twelve drawings, the course taking about six weeks.

The pupils then draw from models and casts of ornaments, and as in their future capacity they will have to correct drawings away from the cast, should there exist any defects in the model, such as broken leaves, missing portions, &c., the pupil

pupil must give a restored rendering of the part. Many good modern casts are in use in this section. Interesting models of hands and feet in planes only, showing exaggerated treatment of sub-cutaneous parts, a head upon a pivot with lines drawn through the eyes, mouth, nose, &c., to illustrate the principles of construction. The pupil is not only required to draw these, but to give a lecture thereon before the director.

Next, the pupils have to draw objects of still life in outline, and afterwards to shade them. The study of botany had to accompany this drawing from nature. The pupils work in classes, eight or ten working from one group of models or cast.

Geometrical and perspective drawing are taught, and the advanced pupils have to attend a series of lectures upon architecture by some well-known professional architect. Seaman's history of art is the text-book used, and plates are supplied referring to the history or period under explanation by the teacher. Composition or design is not taught, as the ordinary teacher of an elementary school is not expected to know much in matters relating to designing. This institution has an excellent library and copying room adjoining it—over 100 students can be comfortably accommodated at the same time.

The management of the various courses is entirely in the hands of the director, who sees every drawing and marks it, and when he considers the pupil capable of teaching he grants him a diploma of efficiency. The time taken to do this depends much upon the ability and industry of the pupil, generally from two to three years.

I may mention that before admission into this school all the male pupils have to pass an examination as strict as the matriculation examination at a university. This also entitles the student to have two years of his servitude in the army remitted.

At Munich, the Kunstgewerbe school is under the direction of Professor Lauge, a gentleman well acquainted with South Kensington, and its method of teaching. It was reorganized in 1868, before which time it was a private institution. Now it is entirely supported and controlled by the State. The building is imposing and convenient, and very complete in all its arrangements. The entrance hall is most artistically designed with painted ceiling and mosaic floor. It serves the purpose of a small museum for students' work. Its decorations were all designed by the students, and the cases of metal-work, groups of models, in relief, objects of ceramic art, all done by the students, show clearly to what an excellent position the school has already attained.

The students are admitted by examination. They must have passed their elementary studies and be proficient in freehand drawing. All the work bears immediately upon practical industry. Elementary and advanced designing for textile fabrics, carpets, and wall-papers occupy several well-attended classes. The designs are made on a large scale on *squared* paper, and supplied in that state to the manufacturers, who arrange them for the loom. The professor thinks it would be better that the weaving and designing should go together—to instruct the designer how to put the design into the loom, and the weaver how to draw the pattern, which is done at Ghent, Crefeld, Roubaix, and other places. I do not think this of much consequence, as pure art must be studied by everyone who aspires to distinction, and once the artist is made, the application naturally follows. Professor Ewald's opinion is, "That a knowledge of pure art forms the basis of all applied art. You cannot expect a man to write essays and poetry before he has received some education, and you cannot expect a student to become a designer until he knows how to draw."

A society of German potters send their apprentices to this school, and they draw, model, paint, and fire the pottery as at Sevres, but of course on a small scale. Students who are going into the pottery trade, and sons of proprietors of pottery works, have the most excellent opportunities of receiving a thorough ceramic instruction, as they have before them the most excellent examples of art applied to ceramic purposes.

There is nothing new or peculiar in the method of teaching drawing at this school. The antique, life, ornament from the cast, &c., are invariably studied and practised. There is a good lecture theatre, where lectures are given by the professors on all subjects connected with industrial art.

Special instruction is given in ceramic work; flower and plant painting from the living models; perspective drawing, which class serves also as a sort of normal school for the training of art teachers; ornamental drawing by young ladies from models; textile designs; lithography, and wood engraving; designing for wall-papers and carpets; architecture, house-painters' and decorators'; chasing, engraving, and other metal-work; glass-painting, modelling, and wood-carving.

The work done in all these classes was well done. In the Royal Museum there is also a large collection of antiquities.

A general scheme for instruction in drawing in use in a great number of schools in the United States is as follows:—

First grade, or elementary drawing; and in connection with it inventive drawing and copying.

Second grade, application of free offhand drawing; including copying, geometrical drawing, drawing from nature, and inventive drawing.

Third grade, or outline sketching; with a continuation of copying and inventive drawing.

Fourth grade, perspective drawing exclusively.

This plan is in accordance with nature, as relates both to the pupil and to the subject.

General directions for further practice in different departments are:—

First.—To draw various forms; for if the instruction given is to communicate any formal culture, the child must, as has been said, comprehend its entire scope. It is an error to choose artificial forms only, or natural forms only. The teacher utterly misapprehends the character of the common school who causes architecture, or tools, or flowers, or landscapes, either of them exclusively; nor is it the business of the common school to educate especially for any one occupation, such as that of the carpenter, the cabinet-maker, potter, &c.

Secondly.—It is the universal rule to begin with what is easy, and to proceed from that only with great caution. Now the easiest part of drawing is that with right lines; not, perhaps, where the fewest lines are used, but where the relations of lines and angles are easy of comprehension. Of the regular forms, for instance, an easy one is the regular octagon, and a difficult one the regular pentagon. Irregular forms are easy if they are derived from regular ones, as, for instance, the semi-circle, but difficult otherwise, as in the case of the eye, nose, ear, hand, &c.; all animals, most flowers and fruits, all trees, most tools, &c. Thus many of the designs most frequently given to children are improper for the purpose.

Thirdly.—

Thirdly.—The pupils receive the necessary explanations and assistance. Here failure is frequent. Perhaps the pupil is set to copy a flower. He begins at once at one of the extreme points, and goes on to draw leaves, anthers, petals, pistils, &c., one after another, as zealously as possible, down to the minutest parts and details. After long and careful labour his flower is finished, an excellent flower, but unfortunately quite different from the original. There are schools where drawing is practised in this manner year after year; but how easily would the pupil have accomplished his work in the case proposed if he had at first been taught how to see the blossom correctly. The fundamental form would have perhaps been laid out by three or four points, and all the details would then have fallen into their places of themselves. It must be plainly said that in most drawing schools instruction in intuition and apprehension is unjustifiably neglected. Many teachers have scarcely an idea of the basis of all drawing, of which the judicious Brauer, in his "Theory of Free Apprehension," has observed, "Before any figure is drawn it is necessary that it should be seen or understood in all its parts and relations." Here is a primary reason why so little progress is commonly made in this study.

But supposing that all the conditions hitherto laid down have been complied with, then—

Fourthly.—It must be strictly required of the pupil that he draw well—that is, with entire neatness, and correctly. No botching or working over, indistinctness or fancifulness, smearing or rubbing, trifling or talking, will accomplish this. The whole of the pupil's power must be earnestly and perseveringly exerted upon his work. It is only by this means that drawing will become the important educational instrumentality that it may be made.

Working in company is much to be recommended. The task may be given out, the mode of performing it stated, and then followed at the same time from point to point by all. This trains to intelligent, orderly, and regular labour. It is unnecessary to argue that all possible means should also be tried to enlist the interest of the children in the work which they are to do, and to conciliate their love of it.

#### *Details—Elementary Drawing.*

- (a) Should elementary drawing follow geometry, or geometry drawing? Neither, and for this reason: that the order of study of the two subjects must often be very different. Geometry considers the triangle before the square, while in drawing many squares may be considered before many triangles are. And much that pertains to geometry is of no importance to drawing; for it results from the nature of the case that the portion of geometry which is of use in drawing is studied during intuitional instruction, and therefore long before drawing is commenced. Such points are—ability to recognize a right angle, a square, a circle, &c. I find no use in connecting geometry with drawing. But it is a difficult thing to repeat while drawing the fundamental forms—that part of geometry which relates to them. This will aid in thorough comprehension of the case, and it is to be recommended.
- (b) There are elementary exercises which consist in drawing right and curved lines by the children together by beat, large free lines, if possible with a movement of the whole arm. These exercises are of great importance; they should be practised at the same time with such others as require the closest care, and where, therefore, the pupil is working more by himself and in detail.

(c)

- (c) Exercises in estimating the lengths of such straight lines as may be found at hand, by natural or artificial means, may, from time to time, be introduced between the drawing exercises proper, but should not be carried too far. In arranging the subjects for practice, the objective and subjective order should be, as far as possible, united. According to the purely scientific or objective arrangement of the fundamental forms, the equilateral triangle should come before the rectangle; but in drawing the order should be different, because the latter is much the easiest to draw. The same is true of the pentagon and octagon. A course of instruction arranged with reference to subjective principles may, it is true, at first seem disorderly rather than orderly, but a more acute vision will discern the "red thread" which leads through the whole.

#### *Copying.*

- (a) Subjects beautiful in themselves should be selected for copying. For example, a finely-formed vase should be selected rather than a common kettle. The faculties used in drawing will be as well trained by one as by the other, while the former is of greater value in developing the sense of beauty.
- (b) For beauty of execution, only the very best designs are sufficiently good; those only moderately good cannot be applicable.
- (c) For the purpose of working in classes together, the use of designs large enough to be seen by the whole class—those made to be hung up—is much to be recommended. An industrious teacher will, if necessary, prepare such himself.

It is still more important that the teacher be able to design on the blackboard. Hippius says:—"The children can see the drawing constructed; can watch the beginning and the end of it; and can obtain more thorough ideas as to apprehension of objects. They should themselves proceed to imitate these drawings, which should be suited to their capacities, on a smaller scale. The manipulation of the work should be such as to serve as a model to the children; the teacher locating in the proper places the necessary initial points in a careful, I had almost said learner-like, manner. When the figure on the blackboard is complete, it should be analysed, and understood both as a whole and in the relations of itself to its parts, and of the parts amongst themselves. After this mode of intuitional study has been sufficiently practised, the teacher should again go through with the process of drawing the figure as it were in his thoughts, by dictating the work point by point. At the same time he should pass round among the benches directing and assisting wherever necessary, reproving or praising, and endeavoring to keep all the pupils in cheerful activity.

- (d) Even when the children draw each by himself after small separate originals, they should often be made to draw their copies on a larger or smaller scale, for the sake of gaining in freedom of conception.
- (e) With an eye to the ultimate and principal purpose of instruction in drawing, it will be better for the pupils to sketch many objects with few strokes, than to occupy the same time over a few drawings more elaborated. But these latter should not be entirely excluded. The best mode is to produce from time to time some larger work, and to draw between or along with these many sketches not so much finished in detail as full of meaning.

(f)

- (f) For copying, more reference should be had to the sex of the children than was the case in elementary drawing. Thus, architectural subjects should be chosen for boys, and beautiful vases for girls, weapons for the former, flowers for the latter, &c. One-sidedness in selection should, however, be avoided. The girls should be made to comprehend the beautiful forms of the higher departments of architecture, and the boys the characteristics of leaves and fruit. In short, to repeat the principle once more, it is the whole world of forms which the school should prepare its pupils to comprehend.

### 3.—*Inventive Drawing.*

- (a) This may be practised both upon spontaneous conceptions and upon real things. In either case, the pupil may be required either to complete a design, to decorate it, to vary it, or wholly to invent it. For instance:—
- 1st. Ideal representations.—Completion: To draw the whole of some figure from half or a third of it. Decoration: To ornament a rectangle with lines all converging to its centre. Variation: To change a regular octagon into an irregular one. Entire invention: To draw several equilateral triangles, and decorate them at pleasure.
- 2nd. Real objects.—Completion: To draw a window, having one quarter of it given. Decoration: To ornament a design for a table top. Variation: To change a quadrangular window into one with curved lines at the top. Invention: To design a beautiful trellised gate.

The usual order of these exercises should be—first, free representations of real objects, together with drawing mathematical figures. Completing a design is usually easier than decorating it, and that again than varying it; while absolute invention is the most difficult of all. The lessons should be arranged in accordance with these principles.

- (b) Occasionally an entire class, or at least a section of it, should work together at invention. If, for instance, the problem is to decorate a square, the children may step up to the board one at a time, and work upon a square drawn upon it. This will furnish many opportunities for remarks, and the inventive faculties of each pupil will benefit all.
- (c) Sometimes the pupils should merely sketch their conceptions without completing them, and the teacher may then criticise the sketches. In this way several designs may be sketched at one lesson. The slates may be sometimes exchanged about in such a manner that each pupil can see the designs of all the others.
- (d) Invented designs, which are to be finished in detail, should be approved in outline, to prevent expending hours of the pupil's labour on a design which may perhaps at last be rejected.

### 4.—*Drawing from Nature.*

First, as to geometrical drawing from Nature:—

- (a) Either actual objects, such as are about the children, should be drawn—doors, gates, floors, trellises, windows, cupboards, stoves, monuments, &c.—or there should be used, as Otto very judiciously recommends, an apparatus on purpose, by means of which all sorts of figures can be set up together on a ledge of the blackboard. The drawing may either be of the natural size, or on a reduced scale. In the latter case much care must be taken that the children shall justly estimate the relative sizes of the reduced objects.

(b)

- (b) Just at this point it is of especial importance that in the beginning especially much work should be done in common. Before the children put pencil to paper, they must fix upon all the relative dimensions, not by means of a mere cursory view of the object, but of a careful survey of it. It should be a point of honour to come as near as possible to correctness. When all the estimates have been made, the teacher may name the dimensions before the class, and then they may proceed to draw.
- (c) This is a very appropriate way for tasks to be performed at home: "Draw the front of your father's house, the windows of the sitting-room, &c.; I will take occasion to compare the drawings with the originals," and so on.

About this time a beginning may be made with perspective drawing, as follows:—

- (a) Practice the children in seeing real objects in a perspective manner. This is not very difficult, and has the advantage of showing the pupil what perspective is, even if he does not become able to draw on its principles.
- (b) Perspective may be taught by copying. Perspective designs may be given to be copied, arranged in a progressive manner, and instruction on the laws of perspective may be given at the same time. This is the method of Soldan, Warmholz, and others, and is not liable to any weighty objections.
- (c) Exercises both on copying and seeing should be practised.
- (d) Drawing from real objects should be practised either by section of the class at once or singly. Drawing is of course a more useful exercise than mere seeing, and drawing from real bodies is better than from another drawing. And it is better to display the article to be drawn conveniently upon a table for one, two, three, or at most four scholars, than to elevate it somewhere for the whole class to draw from. The circumstances must govern in each particular case. I would, however, have some exercises in seeing in every school where drawing is practised at all. I add a few limits for such as have proceeded far enough to draw real bodies.
- (a) To complete the shading of what is drawn should be unconditionally forbidden. The common school has no time for this, if the children are to be made at all acquainted with perspective.
- (b) The subjects should not be too difficult, as for instance plaster heads, landscapes, or groups or animals. The principal thing is to teach the children to comprehend and represent with ease the simplest perspective appearances.
- (c) The children should not be troubled with difficult theories of perspective, nor, on the other hand should they be restricted to the brief rule "Draw what you see." Some knowledge of the laws of perspective is indispensable for the less capable pupils, as well as an acquaintance with some simple means of aiding in seeing in a perspective manner.
- (d) These laws of perspective should not be given but discovered. It is wrong to tell a pupil that a circular surface or thin body can be seen as a straight line, and then to hold it up to him that he may be convinced of it.
- (e) The most practical possible application should be made of the principles which lie within the scope of common schools. These should be joined to the exercises on cubes, and prisms, for instance, a drawing of a chimney, a chest of drawers, an open door, &c., and the best scholars may afterwards draw a house, a bridge, a gateway, &c.



### 5.—*Outline Sketching.*

- (a) The common school is not the best place for designing pillars, capitols, and architectural constructions; they belong to the industrial school. The business of the common school is limited to this—

1st. Geometrical lines, angles, and figures.

2nd. The application of these to the drawing of simple sketches and ground plans.

- (b) Great skill may be attained in this, so far as it can be carried with the aid of the simple instruments which the children can be trusted to use. Without using these the practice does more harm than good.

- (c) The use of the circle and ruler must be industriously practised in order to acquire skill. Many simple problems should be given one after another, each half as large as the preceding, to magnify to many times its own size.

- (d) As to selecting subjects for ground plans and elevations these suggestions may be of service—

1st. Select for drawing a plan of a school-garden, the church-yard, or a building, a church, an elevation of the school-house.

2nd. Let the children copy some plans—ground plans, elevations, etc.—in order to become acquainted with the usual method of doing such work.

3rd. Let the pupil himself make out some such plans, ground-plans or elevations, of his father's house or garden.

Drawing is the language of industry, and whether it is in schools where art is applied to industrial purposes, or in those where science is placed at the service of our producers, it is always drawing that must be encouraged and developed, and we must not remain stationary while all around us the whole world is progressive.

Our business is not to servilely copy but to apply; to see what other nations have done in the matter, and then, having in view our own circumstances, surroundings, and conditions, devise such methods as we are convinced will meet with success, and from the experiences of others, noting their successes and failures, develop and organize something to meet our own case.

Another method which has also been extensively practised in many schools, and which has given tolerably fair results, is that the course of the study of drawing in common schools of three classes should be practised only in the middle and higher classes, not in the lower. It is safe to calculate that children of at least three different grades are always to be found in each class, so that division must be made. More than two such divisions are usually too many, as experience indicates. Thus each class will have a two years' course, and each pupil will, at least in that part of the study where the whole section works together, go twice through one of the halves of the course.

- (a) **Middle Class.**—Here it will be well to permit the capacity, industry, and progress of each pupil, to determine which half of the course he shall go twice through with. The course should be as follows:—

First half,—

1. **Elementary Drawing**—Lines, angles, the easiest divisions of lines and angles, the rectangle, isosceles triangle, square, rhombus, rhomboid, equilateral triangle. Straight and curved lines together, by beat.

2.

2. Copying—The simplest forms with straight lines, partly representations of real things, partly variations of fundamental forms.
3. Invention—The easiest exercise in completing and varying forms ; usually to be executed in common.
4. Beginning of estimating dimensions—Usually of those where one of the dimensions to be estimated may serve as a measure of the others.
5. Examination of the model drawings.

Second half,—

1. Elementary drawing—Continuation of the division of lines and angles ; the regular hexagon ; the regular octagon ; different curves on straight lines, and half and quarter circles ; irregular polygons ; waving, serpentine, and spiral lines ; the circle, ellipse, and oval ; curved strokes together by beat.
  2. Copying—In the first half-year of designs with straight lines only ; in the second, of those with curved and crooked lines. The straight lines should always be in simple combinations, the curved ones in connection with straight ones ; and easy flowers and fruit given only to the most-capable of the children.
  3. Invention—Tastes somewhat more difficult, but no designs of real objects yet to be permitted.
  4. Drawing from nature—Very easy elevations, and only to be practised as a secondary exercise.
  5. Study of model drawings.
  6. Estimating dimensions—Partly with and partly without the use of the legal measures of size and distance.
- (b) Upper Class.—Here the scheme must be a little more carefully arranged. I suppose the children to draw in perspective only during the last year of school, and then during both lessons ; so that their copying and inventive drawing must be done at home. The children of 13 years of age, again, should form one section (section 1), and those of 11 and 12 another (section 2). Then the instruction for the year may be arranged as follows :—
1. From Easter to St. John's Day : For section 2, off-hand drawing ; exercises in copying and invention. Section 1, perspective, first beginning.
  2. From St. John's Day to Michaelmas : Section 2, off-hand drawing, copying, invention, elevations. Section 1, perspective, continued.
  3. From Michaelmas to Christmas : Section 2, outline drawing. Section 1, perspective, further continued.
  4. From Christmas to Easter : Section 2, outline sketching, ground plans, and in off-hand drawing, copying, invention, elevation. Section 1, perspective, concluded.

Observations on the foregoing plan,—

1. In the first quarter section 2 is so employed that the teacher may busy himself with section 1, where his aid will be quite indispensable ; and in section 2 also the exercises, in copying especially, can be adjusted to the capacities of each individual scholar.

2. In the second quarter section 2 will have advanced far enough to work by themselves for, say, half an hour at a time. That time may thus be spent in introducing section 2 to the department of drawing elevations. The pleasant summer days will be found quite suitable for drawing in the open air, and the pupils, while unoccupied during vacation, may execute many drawings. Towards the end of this quarter, section 1 may be set at drawing easy buildings in perspective in the open air.

3. The third quarter will find section 2 busily employed with circle and rules. The pupils of 12 years old, who are going over the ground a second time, will be able to assist those of 11, so that the teachers will get time to do some pleasant open-air work with section 1. But if he does not think it safe to leave section 2 alone he may take them out also and let them sketch elevations.

4. When winter comes round again section 1 will be employed again in the house in learning something of drawing bodies bounded by lines not straight. Section 2 will take up off-hand drawing again in the departments of copying and invention, and some ground plan may also be drawn.

5. The exercises in copying and invention should continue what was begun in the middle class, but not too rapidly. For copying, pictures of flowers, fruit, ornaments and characteristic animal forms may be gradually introduced. The inventive drawing may be in part of imagined forms, in part from real objects. No teacher who pursues his subject with a really vivid interest can fail to find abundance of materials for lessons and models.

#### 2. Common schools of two classes.

(a) Lower class.—If the pupil remains five years in this class he should draw during the last two. Thus we shall have pupils of 8 and 9 years of age in one section, so that each will go twice over the year's course. The course should include all the first half of what was prescribed for the middle class of a school of three classes.

(b) Upper class.—Here there are many difficulties. I shall suppose two sections to be formed. One of the pupils of 10 and 11, and the others of those of 12 and 13, so that each section shall go twice through the course. The lower section should draw what was directed for the upper division of the middle class in a school of three classes. The first division may alternately draw in perspective one hour, and in the next partly make outline sketches, and partly work at copying and inventing. There are many disadvantages in this arrangement, but I have not been able to make a better one which was not too intricate, and our pedagogical literature affords very little aid on the subject.

#### 3. Common schools of one class.

Nothing can here be done in perspective. The pupils should draw from their tenth year upwards in two sections. The course of study should be that for the middle class of the school of three classes, except that the children should learn something of outline sketching during the last half-year of their schooling. Some of the better scholars may perhaps be permitted to copy some of the exercises laid out for the middle class.

It is necessary to beware lest the instruction in drawing educate the children in falsehood. Where every drawing which is shown at an examination is more than half done by the teacher, or by his assistants, such a result is certain to follow.

“ Act

"Act honestly," says Hippius, "let your examinations be a proof, not of what your powers as an artist are, but what you can do as a teacher, through the efforts of your pupils. Honour truth and she will honour you in return."

2. The purely technical exercises of off-hand drawing should chiefly be done on the slate; but copying, elevations, finished inventive drawings, &c., on paper. It is necessary to be economical, but then pains should also be taken to enable the children to enjoy repeated examinations of what they have drawn with care and industry. It is always unpleasant to children to see a piece of work which is carefully finished thrown away at last.

3. Avoid all luxury, especially in poor neighbourhoods, in pencils, paper, &c. The children should understand the necessary truths that man must always learn to accomplish the greatest possible results with the simplest means.

4. It is not judicious unsparingly to cross out every ill done work from the pupils drawing book, for this may frequently destroy in a moment the work of many laborious hours, besides disgracing the book, as the children say. Only evident idleness should undergo so severe a punishment.

5. The strictest care should be taken to make the children sit correctly while drawing; for carelessness in this particular will very easily lead to crookedness in weakly children. It is a great evil for the pupil even to turn constantly towards the right hand to look at the design to be copied. A conscientious teacher will use every means of avoiding such habits.

6. The pupils must be protected from too bright sunshine, by curtains or some equivalent means.

7. All conversation should be strictly forbidden during the drawing lesson. It is astonishing to what an extent the looking off from the work, which is inseparable from whispering, interferes with and defeats the comprehension of the design and success in reproducing it.

8. The frequent use of India rubber is decidedly to be prevented. This is, in many schools, practised to a miserable extent; no drawing being finished without having been rubbed out in every part, nobody knows how many times. Instruct the pupil in a truly elementary manner, teach him to apprehend, make him work with attention and care, and away with the India rubber!

9. Whatever work is given to the children to be done at home must invariably be shown and examined when completed.

10. If possible, let the most skilful pupils be employed as assistants in instruction.

I have set down these rules at length as they may be found useful by the teachers in the public schools of New South Wales.

#### TECHNICAL TRAINING.

The question as to what is the best method of giving a technical education is the great problem of the age. Upon its proper solution the prosperity of a country, as regards its agricultural, industrial, and commercial relations may depend. The fact that it concerns the masses of the people, the working population, over whom the Government ought to watch with an ever increasing solicitude, gives it this interest. It is exactly this class of instruction which assists to enable the future man and woman

to

to earn their living, and by producing a good class of workmen to place the country in the best industrial position. The desire of all countries to produce a class of work by which the population can live extends itself year by year in direct proportion to the relative numbers of its population, or to put it in its plainest language, its importance increases according to the number of mouths there are to fill. It is, therefore, not only a social question but a political one of the most serious character, and its development must become a general and irresistible law. Its imperative necessity is self evident, and its practical utility is conceded by every authority who has carefully considered the subject, although these men are not altogether unanimous as to the form the instruction should assume. It is to these opinions and experiments that I shall direct your Excellency's attention, setting forth the work that has been done in different countries and the particulars of the various systems adopted, with a view that in the development of technical education in New South Wales we may be in a better position to judge as to the class of work which has to be accomplished. In carrying out this intention my personal examination of schools and general inquiry have been chiefly directed to what has been accomplished since the time the Royal Commission appointed by the Imperial Government completed its inquiry. And although for the purpose of making comparisons it may be necessary to go over some of the same ground, this will be avoided when possible, and only acted upon when desirable to express definite opinions of any particular type of school which has been thoroughly successful or otherwise, and I shall only occupy myself with those that have stood the test of experience.

If we divide the future occupations of the youth of all countries into agriculture, production, manufactures, distribution or commerce, and the learned professions, we find that in the provisions made by the public schools the teaching is of such a character that it would seem that all our young men were to become parsons, clerks, or lawyers. There is nothing industrial in the curriculum, or anything really adapted to the requirements of the country in the entire system. There is no effort made in any direction but in that stereotyped method of cramming for certain class standards, made absolutely necessary by the method of inspection adopted by the Department. The endeavour seems to indicate that the culture of the masses should precede industry. This must be wrong in principle, as it has been invariably acknowledged that the ornamental should wait upon the useful. Dr. Sullivan, the able President of Queen's College, Cork, in his report upon the Cork Industrial Exhibition, says:—"The most useful kind of knowledge we could have is to know the extent of our knowledge, or to put it otherwise, to know the extent of our ignorance. Now hand-skill comes of use, consequently if we have not certain branches of industry among us, and that all or nearly all our trades are languishing, we may fairly assume that we lack altogether certain kinds of hand-skill, and that the condition of all is relatively low. This should be self-evident to all who are not wilfully blind. The talk about technical education is a vague recognition of the fact. Nevertheless some of our artizans and many manufacturers not only do not seem to see it, but in too many cases act as if they entirely disbelieved it. When the Irish workman, and here I include agriculturists and all labourers engaged in work requiring more or less skill, becomes thoroughly conscious of his want of technical skill, both of brain and hand, the prospect of Irish industry will be more hopeful than now. In pointing out our deficient technical skill I hope I shall not be misunderstood; in the first place, I do not depreciate the capacity of the head or the capability of the hand of Irishmen—  
perhaps

perhaps I am prone to over-estimate both—what I want to convey is, that compared with our neighbours and the other peoples with whom we are directly or indirectly in contact, we lack many qualities essential to industrial success, namely, systematic well-organized school training adapted to our wants, the acquired habit of steady persevering work, forethought, and well considered enterprise. Our farmers are slovenly and careless, and, like old world farmers everywhere, wedded to old habits and indifferent to the teaching of science, and to the help which they might derive from a course of instruction in a good agricultural school. Our artizans are in many cases good all-round men, that is, men capable of doing every kind of work belonging to their trade fairly well, but not perfect masters in any one branch. This defect is the inevitable result of the absence of extensive works which admit of division of labour and consequent higher skill of workmen, who devote themselves exclusively to one branch of trade. It is not peculiar to our workmen; but as it is a defect which strikes the eye of every one, while it is only experts who can recognize the real merits of the work of our artizans, our workmen should acknowledge the defect and strive in every way to overcome it. One of the most disastrous effects of small and desultory trade, especially where it is in a state of gradual decay, is the absence of a desire to learn new methods or adopt new processes, or new designs. The worst effect of all is when a workman thinks any kind of work good enough and takes no pride in his work—that noble feeling which transforms the workman into the artist. Scarcely any of our workmen know how to draw, and very few know mathematics and mechanics, at least in a way to be practically useful. These defects, though grave in themselves, are the result of circumstances which are not permanent and could easily be remedied. A good system of technical education would go far to do so; but everything depends upon its being sound. The science which the workman wants must be real, not the kind of plaything which does for public examinations and conversaziones. The mathematics should not consist of schoolmaster's conundrums; the physics and chemistry should consist of an accurate knowledge of laws and their useful applications, and not the usual kind of legerdemain which, though it may excite the admiration of the public, is of no practical use. Every workman should learn to draw as he does to write, and be able to make the working drawings required in his trade."

The old trade guilds were admirable institutions when in their bloom, and before they degenerated into respectable clubs of trade monopolists. They encouraged high technical skill, they gave a dignity to labour by uniting the master, the artist, and the workman in the same society, inculcated mutual respect, and above all encouraged trade probity and honor. But old age came upon them and having become privileged bodies in the enjoyment of monopolies, they naturally resisted those changes which all institutions undergo when free to modify themselves in accordance with the ever-changing wants and circumstances of the time. Except where there was some property to which the managers of the guild could cling, as in London, the good old trade guilds have disappeared, leaving behind, however, some wrecks of their customs and usages, such as apprenticeship, very much out of gear with the existing state of things. "Irish workmen if they wish to see manufacturing industry and trade revive in Ireland, should speedily recognise the fact that modern industry is the outcome of the greatest revolution ever effected in the work of mankind. There were, however, some usages of the old guild brothers, both masters and workmen, which, being adapted for all time, might be revived with great advantage to-day: trade probity and honour, self-denial, a high sense of duty, and a feeling

feeling of pride by the workman in his handiwork, and by the master in his craft and in his craftsmen. When sound technical education shall have taken the place of rule of thumb and mere length of servitude shall no longer be considered the equivalent of brain and hand skill, two great impediments to Irish industry will have been removed."

As in Ireland, so in England. Scarcely a generation has passed since the necessity of educating the masses of the people technically was thoroughly recognized, and not more than half that time since the subject was undertaken in earnest. Mr. Henry H. Cunynhame, one of the representatives of England at the Bordeaux International Conference, says :—"Though England was late to begin, as compared with foreign nations, yet her progress in this respect has been surprisingly rapid, and bids fair shortly to place her in possession of a system of schools in no way inferior to those of the continent of Europe or America."

But an opinion is steadily growing up, and every day finding more adherents, that our elementary training, whether for rich or poor, is still incomplete, and that it will not become fitted to the wants of the time until it has undergone some grave modifications. For since the framework of our educational system was put together in the Middle Ages, great modifications have taken place in modes of thought. The criterion of truth is no longer the voice of authority; the schoolmaster must therefore modify his system. He has no longer the right to require the assent of his pupils by a mere *ipse dixit*. His true province is how to teach his class how to observe and how to experiment and learn of nature for themselves, rather than to supply them with an encyclopedia of facts supported only by the voice of authority.

In the Universities this change of system is silently but rapidly progressing; science laboratories are springing up everywhere for the experimental method of study, and mathematicians, imitating the example of men like Newton, Gauss, Pascal, Clarke, Maxwell, or Sir W. Thompson, are going to experiment for the basis of their theories, instead of for ever proceeding by a deductive method based upon a series of unverified assumptions. So that it is now no uncommon sight to see a senior wrangler in the physical laboratory. Even classics, the former stronghold of didactic teaching, is taking the same line. Visits are made to Greece, and scholarships awarded to enable Egyptologists to study upon the spot; and thus understood, classics instead of being confined to an imitation of the style of ancient authors, is becoming expanded over the whole field of ancient philosophy, history, and art, and therefore glows with a life, a truth, and a reality that it never previously possessed. In the great public schools, too, the same influence is spreading; laboratories are being constructed, presided over, not as before by the nearest country medical practitioner, but by men who have regularly taken their degrees in chemistry and physics. There are botanical and entomological clubs, and in the corners of the playground carpenters' shops are being erected.

These shops are, it is true, not yet on a satisfactory footing. Patronized with perhaps a shade of contempt by the classical masters, they are often left to the mercies of some superannuated carpenter, who has never received any sort of scientific education. This neglect, perhaps, proceeds from the entire ignorance that the whole of the principles of geometry and mechanics can be learned in a carpenter's shop, with pieces of wood, nails, and string, in a manner in which they can never be acquired in the class-room. Not for a moment is it intended here to depreciate the use of high mathematics, but the principle of virtual velocities, or the conservation

of energy, is not half so vivid or real to the boy who has never gone beyond paper work, as it is to one who has been allowed to construct a wooden scale-beam, or been permitted to handle even a home made gyroscope.

Little children have nearly solved the question for themselves, by refusing to learn except through the eye and the hand, and for them the Kindergarten system, when properly used, serves as a method of experimental education.

Board Schools have very properly been framed after the model of the best public schools, and will, therefore, probably have to follow in their wake. For if some sort of experiment has been found beneficial in the case of those who are to follow learned professions, how much more valuable must it be to the artizan?

Moreover, other influences are at work, making the need of it still more imperative. Up to the present century industries were secrets, they were the property of cliques and classes, they were mostly carried on on a small scale, and the workmen, as well as the industries, were localised in centres, often fixed for them by political considerations, but from which it was very difficult to move. But printing has almost destroyed the secrets of industries. The growth of ideas is destroying trade corporations and privileges. The invention of machinery has diminished small factories; and the railway, while it has increased the localisation of various trades, has enabled the population of artizans to flow freely from one place to another. And thus, in less than a century, the whole industrial system of the country has been revolutionised and reconstructed.

This reconstruction has its good and its bad side. Manufactured articles of all kinds are incredibly cheaper than they used to be, regard being had to the change in the value of the money standard. Moreover there is, for all who choose, far greater chance to enter the class of skilled artizans. But, on the other hand, the mechanic is kept week after week and year after year, at the same monotonous employment; and specialization of labour pushed over-far tends to the degradation of the workman and the diminution of the art-value of his work.

This evil produces the result that although the entry into any trade is more easily open to a mechanic, yet education in his craft becomes more and more difficult, and it becomes more and more hard for him to rise from the ranks; and in all trades in which individual skill, adaptability, and thought are required complaints are increasing that the skilled workman will soon disappear.

Under the old system apprenticeship was the only road to learn a trade. The apprentice paid a fee for instruction, and received his board and lodging as an equivalent for his work. If idle his master corrected him; if he ran away his chance of employment elsewhere was very small. The master who took an apprentice often gained a friend, a future partner, or perhaps a son-in-law. There was then every inducement for a master to teach his apprentice, and accordingly apprentices were carefully instructed. There were abundant numbers of good artificers in proportion to the demand for their work.

Apprenticeship is defined by Professor S. P. Thompson as the process by which a boy or an inexperienced man apprehends or learns to practise any craft, art, trade, or profession. This formerly was made the subject of a legal contract whereby the master binds himself to instruct the apprentice, and the apprentice to serve his master faithfully. The term is, however, sometimes applied to the period of time during which such process of learning is continued. Apprenticeship is a process of learning



learning a trade, and should be subject to definite principles. There must be a right and a wrong way of teaching it. For education is a science, the general principles of which are equally applicable to learning to read and write, to building houses, to making machinery, to printing books, or to moulding pottery. Where the trade was taught with intelligence and a general knowledge of the principles of science underlying it, the apprenticeship would be an excellent way of learning it; but, on the contrary, where these principles are ignored and nothing performed but by the rule of thumb, it must be equally clear that the apprentice is never likely to become a good workman under that tuition.

In order to realise the vast difference which exists between a scientific and unscientific apprenticeship, Mr. Thompson takes a definite example. He selects from the various trades, crafts, and professions, that one in which, in his opinion, the idea of a scientific apprenticeship is the most nearly fulfilled. This is the profession of medicine and surgery. He says:—"Supposing we had the duty of training a youth for the medical profession, what kind of a training should we give him to prepare him for his career? I presume we all know that no man can practice in this country as surgeon or physician without a diploma or license, and that such a diploma or license is only granted to those who have been for several years pursuing a course of studies in the theory and practice of their future profession, and have attained to a certain degree of proficiency, as attested by the certificates, they form one or the other of the various recognised medical schools."

"Suppose, however, that leaving the accepted routine of lecture-going, reading, dissecting, and hospital practice prescribed in the schools of medicine for our young aspirant, we were to adopt the following course:—Keep the youth for five years studying metaphysic and dialectic; then, at the end of this period, send him straight to work amputating and drugging, under the directions of an overlooker, whose best qualification was that he could drive the young student through the greatest amount of paying work in the shortest possible time. Suppose, moreover, all theoretical instruction, all access to books, to be carefully eliminated, and that meantime he should be taught to laugh at and despise the notion that theoretical knowledge was of any service to him; even dissection, for the sake of adding to his knowledge and experience, being forbidden him, as not being paying work. Suppose this to go on for seven long years, the only change in the routine being that towards the close of his time he should no longer be required to perform such menial offices as washing floors or running errands. Suppose, I say, this course to be adopted, and deliberately defended as a system of medical education, what would be thought of it?"

"Yet, strange as it may seem, the outrageous course which we have allowed ourselves to suppose, is a faithful analogue of that which in thousands and hundreds of thousands of cases is going on to-day, not in the apprenticeship to the medical profession, but in the apprenticeship to the handicraft trades. For the five years of metaphysics, read five years of purely literary study in the elementary school; and for seven years of unintelligent and uninstructed work, read seven years of unintelligent and uninstructed drudgery in a workshop under an uneducated, unsystematic overlooker, selected for that post simply because he is a good slave-driver; and you have not an overdrawn picture of that which goes by the name of 'apprenticeship' in too many of the handicrafts of England."

Mr.

Mr. James Hopps, who reported to the society of arts on mechanical engineering at the International Exhibition of 1878, gives his opinion as follows:—

“In England at the present time, as soon as a boy is sent to learn a trade, all mental instruction is discontinued. He conceives that he has only to learn to work, and in this he is encouraged, both at home and in the factory; at home by the indifference of his parents; in the factory by the indifference of the master and foreman. In fact, he is looked upon as a nuisance, and in the way, for the first year or two; he is set to do the most trifling jobs, and discipline is often so loose that he becomes a confirmed skulking sloven, his powers of mischief being the only faculties that evince development. The reason for work being done in a particular way is rarely put before him, and it is only when he is grown to man's estate that he begins to be regarded of any value. The foreman perhaps notices what branch he shows most aptitude for, vice, bench, or lathe; and to this he is put and kept for the remaining term of his apprenticeship. By this means he becomes perhaps a fair ‘turner’ or ‘fitter’ but rarely both. The neglect of mental training during his apprenticeship is so absolute, that he is a worse scholar by far than when he left school. He lives and works—it may be steadily and soberly,—but to the best like a mere machine. In many cases he does not know how to make the simplest calculations in relation to his work.”

Professor Huxley's opinion is that the old system of apprenticeship is as thoroughly doomed in the different branches of ordinary handicraft as it had long been doomed in physic. Circumstances had altogether changed, and it was quite impossible to think that by the old system of apprenticeship it was possible to obtain the results required for technical education. Under these circumstances there appears to be only one alternative. We might bring within the reach of the young people employed in our great manufactures the means of carrying on their education, in the particular branches of business with which they were respectively occupied, beyond the time when the necessities of practical life obliged them to be at work in the workshop, and also to establish in the neighbourhood of the great centres of industry schools whither those who were learning various trades could resort, and there receive that sort of education which would qualify them to work skilfully and intelligently at their trades.

Mr. George Howell says that trades unions feel that the old system of industrial apprenticeship was breaking down, and that nothing was being put in its place. They had of late been pitchforking children into the workshop without any possibility of his learning a trade. In former days the master knew his trade, or, at any rate, if the master did not the foreman did, and he had a certain amount of responsibility over the boy. But now it appeared that neither master nor overlooker knew anything of the trade, and the boy was put into the workshop supposed to be taught by some one. The workmen had not only no interest in teaching him, but the whole of their interest went the other way. A workman was paid nothing for teaching the boy, and yet was expected to train somebody else's child to supplant him and his children in the workshop. If it were not for the innate generosity of the men the boy would go out as ignorant as he went in; but, generally, if the boy showed attractive qualities, someone would take him by the hand and show him how to do this and that. It was not the working man who opposed technical education.

The manner of educating young artizans is a question that daily becomes more important. I have quoted the opinions of both theoretical and practical men upon

upon the subject of apprenticeship, and these clearly show that the day is past when the seven years of apprenticeship is the only way of entering a trade. Mr. Jevons, writing upon the "State in relation to labour," complains of the practice of binding youths to long periods of apprenticeship. He confirms his own views by reference to Adam Smith, who treats upon this subject in his "Wealth of Nations." But neither of these writers suggest any other method of learning an industry, and it is not so many years ago that Professor Huxley said "the condition of England in matters of technical teaching was simply scandalous." Nothing can afford more positive proof than what occurred in the watch and clock making industries between the Swiss and French workmen. The Horological School of Bessans taught the French artisans how to make good and cheap work, and in ten years (from 1864 to 1874) the Swiss importations into France fell in value from four millions of francs to one million and a half, while the French importations of clocks and watches into Switzerland during the same period rose from less than four hundred thousand francs to over a million and a half. The Swiss then, seeing their trade forsaking them, immediately reorganised their three horological schools, and established three new ones as the only means of placing themselves in a position to get back their trade. Here we have an incontestable proof what can be done, and done quickly, by means of technical education. Lambeth affords another brilliant illustration of how a school of art may afford the most direct stimulus in establishing a new industry in the beautiful productions of the Doulton pottery.

It remains therefore to create institutions in which a rational and scientific apprenticeship will be provided, otherwise we may look for a much fiercer competition than that which already exists between the foreigner and Englishmen in those industries wherein the latter have always thought themselves so very superior to all the rest of the world. However the Government and the wealthy manufacturers of Great Britain have found out the necessity, and have of late years evinced a considerable amount of energy and activity in these matters.

France and Germany have for years been alive to the education of workmen in scientific subjects, and have had institutions to popularise science, if I may be allowed to use the word. The *Conservatoire des Arts et Métiers* and the *Ecole Centrale* have been established since the commencement of the century, and Germany has had magnificent institutions for the teaching of science almost as long as France. Now, however, both countries have found the necessity that a lower grade of technical education is required, and so they have established in France *Ecoles d'Apprentissage*, and in Germany *Fortbildungs-Schulen*.

The technological schools of Europe are very numerous, and increase day by day, and have proved their value over and over again in forming the most thorough artisans in all kinds of skilled labour. France exports millions of value in commodities, of which the chief value lies in the labour consumed in making the article. Every nation contributes to her prosperity in purchasing these commodities. This success owes its origin to those art schools which were established for her children, and in which drawing and designing were taught to thousands. Here is the great secret of success. These schools have formed the taste of the workmen, besides the advantage the Parisian citizens have received in having such Museums as the Louvre and Luxembourg, where they could further improve themselves by the study of the great masters. France sends to the United States of America some £75,000,000 worth of its artistic productions, and to England it also exports very largely.

I shall describe these schools further on in their latest development; but before I do so I will briefly state what has been accomplished during the last thirty-five years by Great Britain; briefly, not but what the subject is replete with interest, but that I simply wish to show how the movement first made itself felt, the necessity that arose for prompt action, and the result. Afterwards I shall speak of the various classes of schools already established in England and on the Continent, pointing out the progress that has been made since the English Royal Commission finished its inquiry in 1883.

The grand inventions of Watt, Arkwright, Cartwright, Compton, Stephenson, and hosts of others, made a complete revolution in the manufacturing industries of Great Britain. Instead of the spinning wheel and handloom, machinery was introduced by which one hand could do the work of fifty. Factories and mills were erected where thousands of hands could be kept at work, and millwrights and operative mechanics made a speciality in producing the requisite machinery to furnish these huge establishments. For a considerable time the exclusive possession of this improved machinery was held by British manufacturers. This position was guarded at all points, and it was made a penal offence to engage English artisans for foreign employment, and until the commencement of the present reign the export of spinning machinery was prohibited. A change, however, had gradually taken place, and British manufacturers began to feel that Continental nations were beginning to erect factories and mills on the English models. They had not only organized their establishments in the English manner, but had engaged English hands to work the machinery, and at the same time instruct their own cheaper labour. Then followed the institution of technical instruction, whereby thousands of intelligent workmen received a class of education that eminently fitted them for work in the factory which employed them. As a consequence, the manufacturing supremacy of England began to decline, and about twenty years ago the position was described by a competent authority as follows:—"The time is approaching when, through the rapidly increasing acquisition of the best machinery by countries already highly advanced in design, the struggle for supremacy in manufacturing will have to be fought out on other grounds than mechanical power or novelty of material; and should narrow jealousies and false notions of economy operate against the skill of our artisans being cultivated in at least the same proportion as other countries amass mechanical aids, we may have to realize in sorrow the narrow views and improvidence of our prosperous season." The time had, however, arrived when the manufacturing public had become seriously alarmed, and the necessity for having more extended facilities to our working classes in the matter of that education which alone can make them first-class workmen.

South Kensington was established, and became the centre from which emanated science and art schools throughout the length and breadth of the Kingdom. Here was founded the National Art Training School, and soon after the Normal School of Science and the Royal School of Mines were incorporated with it. These were the first training schools that provided a practical and comprehensive course of instruction in science and art, and they have provided in a very large degree the science and art teachers in the United Kingdom. A Royal Commission was appointed in 1870 to inquire into.

The report of these Commissioners was published in 1872, and drew public attention to the necessity of a more extended system of teaching for the artisan classes. The Society of Arts lent its assistance in bringing this into practice, and in 1874 established a series of technological examinations, and granted certificates.

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The **Mason College** in **Birmingham** is another institution for providing a thoroughly practical, mechanical, and artistic education adapted to the requirements of the manufacturing and industrial pursuits of the **Midland District**, to the exclusion of mere literary education.

We now come to the period when the city and guilds of **London** came to the front, and began to give their attention to the important subject of technical instruction. It began by the **Company of Clothworkers** giving direct pecuniary aid to technical instruction relating to the textile manufactures of **Yorkshire**. Their support was first given to the erection and endowment of a new wing to the **Leeds College**, and the establishment there of valuable scholarships, open to the surrounding district. They next extended their assistance in the formation of technical schools at **Bradford** and **Huddersfield**, the two most important centres of the woollen trade. In both of these towns large and handsomely appointed buildings have been erected, and complete instruction offered in the arts of dyeing and weaving, as well as in other industrial subjects. The **Bradford Technical College**, which was opened in 1882, is probably the most extensive and efficiently equipped institution of its class in this country up to the present time, and is well worthy of inspection. More than 800 pupils attend its classes. It has separate departments, under experienced professors and teachers, for pure art, weaving, designing, chemistry and dyeing, mechanical engineering, and the sciences connected with building and its allied trades, elaborate and systematic instruction in the nature and properties of the raw material, and the immediate application of design to woven fabrics.

The success which has attended the industrial schools established by law in **Belgium**, **Germany**, **France**, and **Switzerland**, to give such technical instruction to the masses, who have to live by the work of their brains through the work of their hands, is simply marvellous. **M. Rosset**, a Frenchman, and a considerable authority, positively says that the technical or practical work and exercises never injuriously affects the theoretical studies, but, on the contrary, in the subjects of descriptive geometry and industrial drawing, manual labour acts as a stimulus to the pupils. He states that in his school (**Charleville**) practical work in the workshops and laboratory occupies two hours a day, and that the pupils beg to have the time extended. Many of them possess great skill. The shops and all the works are under the direction of a civil engineer, and under him are three foremen—one in the fitting, another in the smiths', and a third in the carpenters' shop. The proceeds of the labour of the pupils, if any, go towards the maintenance of the workshops. In the fitting shop the most skilful pupils are occupied in putting together high-class work, such as engine work, while others are making tools and other machinery. In this school there are thirty carpenters and fifty smiths and fitters, besides the pupils who are occupied with manipulating in the laboratory. This is a fair description of the middle-class French industrial school, and applies also to those schools where trades are taught. It affords independent and direct testimony that the mental and physical powers are in direct accord, and can be simultaneously or concurrently educated with advantage to both.

**Professor Smith** says:—"That unless the technical education of the producing classes in **America** is provided for better than it is now—that is, general education in the elements of art and science for every child, and in the practice of industrious skill for youth and workmen—all the great natural advantages of this century

country in extent and variety of native products will be neutralized and destroyed." The same author says :—" I would impress upon you that this is a question of general and not of special education. The establishment of special industrial schools only, which after all is only patchwork veneering and remedial, not organic and preventive, will not meet the difficulty. That has been tried and failed, and will do so again. You did not dispel illiteracy and ignorance by educating one quarter of one per cent. of the population, but by teaching all ; and you will not, by any system of special industrial schools that a community will willingly support, be able to educate even so small a percentage of the whole people as that very insignificant fraction, nor accomplish more for industrial skill by them than the education of a few months in the Middle Ages did for the general education of the people without common schools. Our general education must include the elements of art and science, taught to every child in every school, during the whole period of school life, and in reasonable proportion of time to that devoted to other profitable subjects, before special industrial schools are aught but playthings, which they have been, and will continue to be, whenever and wherever they have been established without the preliminary preparation for them has been provided in the common schools. There is no country in the world to-day that can absolutely ignore public education in art and science without becoming impoverished. There is none inhabited by white races that has made so little provision for it as we have, and, as a consequence, no other country imports so large a proportion of the products of skilled labour as America ; and that means a national leakage where there should be a spring of wealth ; raw materials exported, manufactured goods imported, pennies worth sent away to pay for dollars worth, brought here. It seems perfectly unaccountable that while the general education of the people has been so admirably provided for, even if too limited in scope, through being too exclusively literary and theoretical, and the technical education of the professional classes developed in the most complete manner, yet, though apprenticeships to trades have gone out of fashion, the artisan and mechanic are left without technical education, and, generally speaking, the American workman has to work by rule of thumb. Yet, so it is—while you cannot find in any country a body of men with more average intelligence and brightness than American mechanics, you can find none with so few opportunities of improvement in their several crafts by education. As a consequence our public taste and industrial skill are about in a similar position as the same were in England in 1851. If we are to make a change as radical and complete as was made in that country we must adopt similar means ; and if the political economists are wise in their generation they will find there is no time to be lost in providing technical education for working men."

It is always asked how the State is to be paid for her expenditure in providing for this class of instruction. If the application of the saying that it is better to pay for a boy's education than to pay for his keep in prison is clear as regards general education, then much more is it apparent as regards technical instruction. The apprentices' municipal school costs Paris a large sum a year, and the working expenses also reach a considerable amount. The return to the city is made in the beauty of her fabrics, and has proved a good investment. The art and taste developed and applied in these schools give the city wealth and magnificence. Her workmen can design and decorate, carve and engrave, model and paint, in a way superior to others, and this has been obtained by means of art schools. It could not possibly be effected without them. Therefore the French are wise in their endeavours to keep the position Paris so long ago acquired—the mistress of the world, as regards all kinds of art industry.

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Many alternatives have been proposed in order to obviate or diminish the evils referred to. The difficulty in getting masters or directors of joint stock companies to take a sufficient interest to have apprentices taught seems to be too great to be surmounted. There are two antagonistic forces. The one endeavours to take the boy as he comes from school and teach him as an apprentice to learn his trade in the best and most economical manner. The other is to take him and set him down at a machine and actually to make him a part of it, because his labour at once pays, and he is neither trouble nor expense to the establishment.

To revive the old system of apprenticeship is impossible in manufacturing industries, because the division of labour is carried out in these establishments to so large an extent that it is impracticable for a youth during a term of apprenticeship to learn more than two or three operations. He either works a lathe, a planing machine, or a boring machine; and in order to get the most out of his machine it is absolutely necessary for him to devote all his energies to it in order that the company to whom he belongs, quite as much as the machine he works, may get the largest possible money value out of him. It certainly were much to be wished that the old system of apprenticeship could be revived, and the apprentices taught the science that underlies their work in evening classes.

There is a vast difference in trades, and for our purpose we may roughly divide them into two classes, viz.,—Those trades or handicrafts, such as masons, bricklayers, plumbers, builders, and such like, whose work is carried on with hand-tools, and a workman has to carry out and produce work without the aid of heavy machinery; and, secondly, those manufacturing trades for the production of machinery and of articles made by machinery in the workshops, such as steam and gas engines, watches, sewing-machines, textile machinery, wood-working machinery, and the work these machines fabricate, such as doors, sashes, machine forgings, &c. It will be seen in the first place that what we call technical teaching will be of much more benefit to the first class than to the second. I will, however, refer to this subject further on, but in considering the object in view, viz., the best method of giving technical instruction, this classification must not be lost sight of.

There are two systems of teaching, each of which has many powerful and learned advocates, and all tuition of a technical character may be referred to one or the other of these two systems. The one combines instruction in the principles of science, the actual teaching of the trade in schools, where not only the science is taught, but the trade carried on, the scholar learning the handicraft and applying the scientific principles at one and the same time.

The second system is to add to the usual instruction in science classes instruction in the practical application of scientific principles in the usual operations of the trade in which the student is engaged by workshop practice as well as by lectures. The student therefore having acquired a certain amount of general scientific knowledge as the foundation of a higher education, is afterwards taught the application of science by workshop experiments in the trade he is to follow. Lectures and work go together in this system, but lectures are made subordinate to real work.

All the differences as to the right mode of giving technical instruction, as I before stated, can be referred to these two systems. On the continent of Europe the first-named system prevails, as there the claims of industrial education are recognized with the most pronounced emphasis. In France the balance of opinion is



is in favour of apprenticeship schools. Great changes have been made, both by the State and by the municipal bodies. Many schools have been organized to give instruction in the manual processes of art and trades to workmen. The most important of these institutions may be classified as schools which propose to give a training sufficient to qualify the pupil to enter a factory forthwith as a skilled workman. These are called apprenticeship schools (*Ecoles d'apprentissage*). Secondly: Schools which prepare pupils for subsequent apprenticeship by giving them some manual and technical instruction along with an ordinary schooling. This is the class of instruction that is now given in primary schools, to which is attached a workshop in which the manual instruction is given; and thirdly, schools for giving technical instruction to apprentices of a regular factory or workshop, as is exhibited in the school attached to Messrs. Chaix's great printing office at Paris.

In most of these institutions the instruction is free; and, wherever practicable, there is a technological museum and library attached to the schools, together with portfolios of architectural designs and drawings of machinery. The Municipal authorities of the City of Paris established in the boulevard de la Villette a model school of apprenticeship. This school began its work in 1872, and has been so successful as to induce not only the Municipality of Paris, but many other municipal bodies to establish schools of a similar character. Further on I shall give a thorough description of this school, which I visited many times under the guidance of M. Bocquet, the thoroughly practical and energetic superintendent.

The Royal Commission appointed by the English Government, visited this school in 1882 and reported its unvarying success. They state it had only seventeen scholars in the beginning of 1873, while in 1881, there were 250, of whom 107 were of the first year, eighty-one of the second, and sixty-two of the third year. That the boys of the second and third years were distributed amongst the two trades that in Paris command the highest wages; and that the students in leaving the school, with few exceptions, earn wages varying from 2s. 6d. to 5s. 6d. per day.

In Austria, Belgium, and Germany, industrial schools constitute a part of the national system of education, and commence with elementary instruction, afterwards admitting pupils at the proper age into industrial schools, and from thence into technological schools and the universities.

In Belgium the Government has evinced the most thorough regard for the instruction of the industrial classes, and professional schools have been established for almost all varieties of trades and industries. Not only in Brussels, but in Antwerp, Bruges, Charleroi, Ghent, Liège, Soignies, Tournay, Verviers, and numerous other towns, throughout the kingdom professional schools have been created, in accordance with the leading industry of the place. Thus, mechanical engineering and metal working obtain at Liège, weaving machinery and lock making at Tournay, mining at Charleroi, spinning, weaving, and dyeing at Verviers.

There are, moreover, some sixty apprenticeship schools for the teaching of weaving; and numbers of intelligent educated workmen are yearly turned out specially qualified for designing patterns for the most beautiful productions of the Jacquard loom, as well as thoroughly instructed in the preparation of materials. All these schools are either subsidized by the Government, or established by the municipality.

Germany and Switzerland are famous for their excellent trade-schools, and technical evening schools. The *Fortbildungs-Schulen*, and *Handels Lehramstalten*,



*stalten*, are technical schools, of a lower order than the polytechnic. These have all been established chiefly for the benefit of apprentices, and give an excellent supplementary education. *Gluerbe-schulen* or trade-schools are established in almost every German town. The amount of good effected is marvellous, and the teaching, in almost all cases, of an excellent practical character.

The *Fortbildung*, signifying continued culture, from fort, continued, and *bildung*, culture, are a sort of adjunct school attached to the district school, or what is there called the public municipal school. They were founded by the law of 1873; and is in reality a compulsory carrying forward the education given in the ordinary school for two years longer, in evening classes of four hours weekly. Its main object is to consolidate the instruction already received, that it may not easily be lost. It does excellent service in this way, and is entirely for the children of the working classes. Children who have gone into real or other higher grade schools, and have passed certain examinations, are absolved from compulsory attendance in these schools.

Mr. H. Solly, a most competent authority, says:—"There cannot be a doubt that workshops are as necessary for completing the technical and scientific training of artisans as the laboratory for chemical and mining students, or the dissecting room and the hospital for medical pupils."

Is it to be thought for one moment that what is right and necessary for improving and completing the technical education of English and Continental workmen is not as absolutely necessary in Australia, where the workmen have far less opportunities of improving themselves than their *confrères* in Europe? Our only aim is to bring the standard of our workmen up to that of other countries, and to impart to them that class of instruction as will effect this when they work in wood, iron, stone, plaster, or clay.

Speaking of compulsory technical training, Mr. Solly says:—"It is true when rules of this sort are made imperative by law, the government which enforces them is sometimes sneered at under the title of a 'paternal' government, or even the more contemptuous epithet of 'grandmotherly.'" Now, there is no doubt that there are great advantages in the possession by any nation of those qualities of self-reliance which enable a community to do all sorts of useful things by means of voluntary effort. Too often this sneer at paternal government is simply a device to excuse Governments for shirking their rightful duties; and whatever else we may have to be proud of, we have certainly great cause in this country to be ashamed of the extent to which both people and Government have lagged behind Continental nations in the matter of technical education.

Wendell Phillips says:—"One of the great problems which confronts republican statesmanship is how to manage the population of cities. The tendency of our time is to gather men into cities. These treble and quadruple while the country only doubles. In every large town and great city is always present a vicious class, a burden and check on the welfare of the community, ready at any moment to become dangerous. The education and moral training of these is of the first importance. Lacking this, republican institutions are sure to be a failure. Every city has two kinds of education for this class; one is the schools, the other is the tolerated temptations and houses of vice. These  
educate

educate men just as much as other schools do. Their results are more immediately visible and more easily measured than those of the book schools are. While there lies on the Chief of Police's table a perfect list of every house in the city devoted to vicious indulgence, and such houses are not closed, they must be considered a tolerated and recognized means of training the masses. Now, idleness is one of the first temptations to vice. Children should be taught how to work, and, if possible, trained to love work. Again, one of the first safeguards against dishonesty is to know how to make an honest living. Seven out of ten who come out of our public schools will prefer a trade, or be obliged to make a living by the work of their hands. My experience is that hundreds leave school at 15 years of age wholly unable to do anything for which any man would be willing or could afford to give them a dollar. Here is the ready and fruitful source of vice and danger in large towns and cities. In my judgment, we have no right to take a man's child from him and keep him till he is 15, or to induce a man to trust his child with us until he is 15, and then hand him back unable and unfit to earn his bread. We have done the boy and the city a harm rather than a good. Education means fitting a man for his life. We have rather unfitted than fitted such a boy for the life of labour which is to be his life. Of course I do not object to any liberal knowledge we give him; neither do I now and here intend to notice or criticise the perfection or imperfection with which this is done. On that I have my opinions, and I do not consider our success in that line anything to be proud of. But I maintain that, as respects that large class of young men and women who are to earn their bread by the labour of their hands, our system is not as good as that which prevailed a century ago, and still prevails in our small towns. The boy went to school six months, and helped his father on the farm or in his trade the other six. At 16 or 18 such a boy came into life able to maintain himself, to stand on his own feet, a help, not a burden or danger to the community; his life a career, not a lottery; the city an opening and opportunity to him, not merely a temptation. Men wonder sometimes at the extraordinary success of what we call self-educated men. Most of them had such a training as I have described, and if they had failed when competing with men merely book-trained that would be more matter of wonder than their success is. I do not ask to have this old system back again, but it gives us a good hint how to amend ours. The boy who is going to college has two or three more years of education given to him to fit him for his future. Why should not the city extend to the children, who prefer some mechanical trade, equal favours, parallel advantages, the same amount of training for their future that the college boy has for his? The discrimination against those who prefer to work with their hands is very unjust."

"Our system of education helps the literary class to an unfair extent, when compared with what it affords to those who choose some mechanical pursuit. Our system stops too short; and as a justice to boys and girls, as well as to society, it should see to it, that those whose life is to be one of manual labour, should be trained for it; the system proposed by Mr. Ruggles seems to me admirably adapted to this end. Its main features must be added to our public school system, which daily becomes more unequal to the task it assumes."

"The developing school is an entirely new suggestion, an instrument and help to education of great value. We put a child into a hall or school, where he sees every variety of mechanical work going on. He tries his hand at any he fancies. Soon his natural bent or taste shows itself. His peculiar genius chooses and clings to

to some one kind of work. He has found his calling. The square peg, as the saying is, has found the square hole, and is not obliged to stagger and stumble through life a square peg in a round hole. This natural bent once found out, we hand the child over to that school-shop which teaches his particular trade, and thus fits him for his life."

"In this school he should be broadly trained in all that pertains to his chosen calling; not be crippled by being confined to some one small item, or portion of it. He should not be crippled by being set—as we used to say when pins were made by hand—to make a pin's head or point all his life. If one portion of his chosen trade fails him, he should have some insight into all its particulars, and be thus able in almost any event or emergency to stand on his feet an independent man. Never let us lose the well known characteristic of the Yankee race, that no shock can ever shake one off his feet, and no fate place him where he would not be worth his keep."

Reverend E. Hale, D.D., says, "The great duty of the State is to make the most out of every child born in the State. These children are born with great diversity of ability, and they must be trained to every variety of calling, if the State be wise. If Jenny Lind be born here she must be trained to music, if John Milton be born here he must be trained to letters, and none of the follies of Adam Smith, or of the other economists must condemn them to heading pins or spinning cotton. But as we live we are fast losing the opportunities for this variety of training. We begin bravely on the broad system of the public schools, but it must be remembered that it is said that the average Boston boy leaves school for ever before he is twelve years old. What is it then for which you have trained him? Anybody who knows the real openings for these boys will tell you that it seems as if they were fit for nothing but to be newsboys, or cash boys in the great retail shops, or sellers of lozenges at the door of the museum. Now, these are not good preparations for life; nobody ever saw a grown up cash boy, or a grown up lozenge boy. My friends, the manufacturers, say that they are glad to have a few of these boys in their mills, but I have to say to them that ten hours a day at the loom or spinning frame is not a good education for manhood or womanhood; and I have to remind them that the prime business of a Christian state is not to make cotton, but to make men and women. We want the trained mechanic as much as we ever did. What follows this difficulty in teaching boys to use the powers God has given them? Why, there grows up a race of inefficient men who have not learned to do anything at all; they are left in the grade of mere brute labour, because they have learned no art or handicraft in their boyhood."

Mr. George S. Angell said that "out of 1,368 prisoners in the Auburn State Prison, N.Y., 1,182 had a greater or less education in colleges, academies, public schools, and elsewhere. This is only about five years since; it is clear therefore that ordinary education affects very little the criminals. Crime arises in a great measure from idleness, and the want of knowing how to work. These criminals had never had any manual or technical training, had been taught no useful art or trade, and their intellectual training had no apparent influence in counteracting their criminal propensities."

"The cost of the depredations of property, the detection and detention of criminals, their trials, the cost of their support in prisons throughout the United States, and all the paraphernalia of criminal jurisprudence might be set down at the least

least calculation, at \$500,000,000; put this sum of money in industrial schools throughout the country and it will give \$50 a head for every child in the land. This would be a cheap investment compared to the expense of detecting, adjudging, and maintaining criminals, for this is a stone that can never be rolled to the top of the hill, but ever rolls back again, while industrial education would give us, out of one generation of children, a cheerful, orderly, serviceable people, self-respecting and respectful of law. What is the remedy? Work. That would be the substantial remedy. Let us train those who are to become citizens in the fundamental rudiments of the arts of necessity. Let us teach them to do something. We cannot teach them trades, but we can teach them how to work, how to handle tools, and how to be independent."

Mr. M'Arthur, the great American authority, writes :—"Who can doubt the salutary influence of practical teaching upon the great evils of society—idleness, and the consequences which flow from it? The pupils would find as much interest as profit in manual lessons—lessons at once scientific and useful—in harmony with modern demands, and preparing the future citizen, the future artizan, and the men of action who are to carry on the great industries of society, in which the laws of God are to be respected, justice upheld, intellect cultivated, taste diffused, and human existence embellished by industry, morality, and genius. In the relations of life there is a moral obligation to know something practical in order to live, and a knowledge of exterior things is necessary to guide us surely in regard to what is either useful or good. \* \* Give the people lucrative employment and you will do as much for their morals as for their comfort. Skilled labour commands the highest wages. A man must have a pleasant home, clothing suitable for his family, the means of educating his children, and a proper reception in the circle of society to which he belongs. Now the same industry, mechanical skill, and ingenuity combined in the productions of useful art, will also procure these different but equally indispensable ends to human happiness and moral excellence. The skilled artizans, by the exercise of his profession, becomes refined in his tastes, and he provides his family with innumerable comforts which 'with sweet succession taught e'en toil to please.' If industrial training alternated with mental exercises it is not unreasonable to conclude that the habit of industry would make a lasting impression upon the pupils, and that upon leaving school many would enter upon some useful pursuit, according to the bent and aptitude which had been developed by their studies." Early impressions often exercise a controlling influence during the whole of a man's life. Zalmon Richards, in his premium essay upon the true order of studies, writes: "Children should be so trained in their early education that they may constantly feel that all their intellectual attainments are valuable only as they use them in the legitimate employments and duties of life. Right here we find some of the gravest defects in our systems or methods of training—thousands of our youth come from their schools of every grade with aimless purposes, and many of them spend aimless lives: or else, perhaps, they think their intellectual training entitles them to a living anyway without hard work. The industrial training needed, and herein advocated, is not a special training for a trade, nor the learning of a trade, but such as will fit all children for any trade or occupation, and show their capacities and aptitudes for any desirable employment, so that they will not be liable to make a mistake in choosing an employment for life, as thousands do."

This accomplished educator is certainly right, for he is entirely of the same opinion as all those who have made the question a close study. There is not a shadow

shadow of doubt that the school-life of a child gives a bias to his after-life. Ignorance of the principles and practice of industrial art, and the unfavourable opinion which their exclusively intellectual training has given them of handiwork or handicrafts work is so inveterate that but comparatively few will enter upon industrial careers. They disdain useful employment, thinking it beneath them. They require something to do that will not dirty their hands or soil their dress and they develop into loafers, shabby-genteel beggars, and often become criminals. The education provided by the public schools does not obviate this, but if industry were taught and exemplified in practice for several years when the mind is susceptible to influence, and when habits can be moulded into any form for good or for evil, then it could not fail to obtain such an influence over the mind as would last a lifetime, and would in all probability develop itself into a more healthy morality, which would give a strength and force to character.

The feeling of disdain for handicraft employment of various natures springs from petty pride and has become almost universal, and unless the State can find some method of checking it and bringing about a more healthy tone it must eventually cause an immense amount of evil, leading directly as it does to anarchy and rebellion. Mr. M'Arthur says the intellect is the reasoning faculty of human life; but the passions are greater in intensity, and work in restless agitation to control the whole character and conduct of the man. Idleness is the well-spring of their power, but industry is one of the limitations to this influence; and a powerful check to chastise and endow it, moderation. It would at least curb those degrading views of labour, which drive such multitudes of the young into the genteel professions from a feeling of petty pride. The connection between idleness and vice is so constant that statisticians assume it to be phenomenal, and their statements, supported by figures, exhibit a frightful view of its extent and progress. The evils of intemperance, of crime, and of poverty, generally originate with those who, for want of manual instruction, are unwilling or unable to earn their living by honest industry; and it is to be feared that unless a general system of industrial training can be extended to all classes, good, bad, and degraded, the best efforts at reformation by individuals will be altogether insufficient to counteract the immoralities engendered by this evil.

Having consecrated a large portion of the last ten years to the study and observation of the effects of technical education, I am of opinion that, where carried out under the influence of practical ideas, the results have been uniformly successful; so much so, that the benefits arising from industrial schools, as against any other form of learning a trade, constitute an advantage which cannot be obtained under any other system. The special instruction that is given by these special means is simply the material demonstration of theoretical principles associated with the manual work, thus bringing handwork and headwork together, less by the pupil's ears than by his eyes. This is the whole secret of the success invariably obtained—a proper combination of head and hand work made to operate together.

It is evident then that the means of carrying out the method in its best form is that nothing should be left in the abstract, everything should be tangible; for it must not be forgotten that young people who have to gain their living by a handicraft have only generally received the elementary instruction afforded by the public schools, not trained to determine logically difficult questions. It is necessary that in speaking of an object that object should be brought before their eyes. It is found by adhering to this principle much time is economised,  
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the impression of the interpretation cannot be a false one, or can any doubts remain after the professor has explained his subject by means of the object itself. For example, let us suppose a class of persons who had never seen an egg. The professor in his descriptions and drawings of its exterior, its colour, its contents, and of everything relating to it, however minute and scientific, would only leave a different impression upon each, according to his particular temperament and imagination, neither of which would probably be the true one, and only more or less approaching reality; whereas if the professor commenced by showing his pupils an egg, and then breaking it before them, the view would be sufficient to render in a moment a just and uniform idea; the image seen by the eye would give each one the same impression, and would never be forgotten. The eyes are the doors of intelligence, and those who argue that object-lessons tend to materialize the intelligence of the student are altogether at fault, because as a rule anyone interests himself more in what he sees than in what he only hears. His curiosity is excited, his attention is caught when he sees the object before him, and the dryness of the object concealed, for the experiment at once appeals to the senses.

Let any professor who describes a machine with a piece of chalk on a black-board give his experience on this question. He will find that in spite of his best efforts only a portion of his class will clearly follow and understand him, while the others will look on with more or less indifference; but let him place on the table a working model, so disposed as to show the working of the machine, and all eyes will at once show their anxiety to hear their teacher commence his demonstration. They see the working of the model, they hear the explanations of the master, and learn more in one lesson than they otherwise would do in ten. This conclusively proves the superiority obtained by this last method. Their attention is not only aroused, but they are irresistibly attracted to learn and understand. All who have made technical instruction their serious study have been satisfied that a great progress in human affairs has been effected in the introduction of handwork in the education of youth—not simply because it develops the activity and skill of the fingers, and familiarizes the pupil with the properties of the matter upon which he works, but because it awakes in him the power of conception in the first place, and, as it were, intuitively to determine the correctness of his judgment in the next. These sentiments of creation and appreciation are natural to mankind, although possibly he would never know he possessed them unless a simple path were shown whereby these powers should be awakened, and the practical man taught how to make the most of them.

Inquiries have been made without number, and commissions appointed to inquire into the best methods of teaching, and while all agree as to the utility and advantages that would accrue from the establishment of institutions similar to the school of apprentices (*école d'apprentissage*), the expense necessarily attending such a course has naturally stood in the way. Moreover, there are jealousies to overcome on all sides, both from the side of the masters and of the workmen. Some masters have virtually a monopoly in certain directions, while workmen have what they call their trade secrets, and as the schools of apprentices give the very best instruction, they are calculated to turn out hundreds of men eminently adapted for masters and foremen with a full knowledge of everything relating to the trade or profession they have been taught. The fact has been established fully and completely that on leaving the school the student is not only a good workman so far as regards the handicraft, that he has a real knowledge of the science which underlies it,

it, as both the theory and practice have been made to march step by step with each other. In order, however, to show the class and character of the gentlemen who have been commissioned from time to time to inquire and report upon this question I will submit for your information that such men as Sir Bernard Samuelson, Mundella, Magnus, Guillaume, Jules Simon, Desmoulins, Bressan, Etienne, Rombaut, have given their opinions, and I submit their opinions for our guidance in New South Wales.

In the oldest European countries, France, for example, it has been unanimously conceded that an absolute necessity exists to create and establish institutions similar in character to the *Ecole Diderot*, or the *Ecole d'apprentissage de La Villette*, where the various handicrafts are taught in the best possible manner. This school was established and carried on by the municipality of Paris, and receives no assistance whatever from the State.

The necessity which existed for establishments of this class has been brought about chiefly by the extreme division of labour in large manufacturing establishments, so that scarcely any of the workmen know how to perform more than the particular work allotted them, and which they have always been accustomed to. Hence managers and foremen have been found extremely scarce, as, where the work is so divided, none of the hands learn how to complete any particular work as a whole. In the old times of trade guilds every apprentice was taught to make the entire article or goods of his trade. A millwright, for example, was capable of making the drawings and erecting the mill, and it can easily be imagined that such work gave great scope and constantly excited the inventive faculties of such skilled workmen, but the discovery of the steam-engine facilitated the creation of great works and led to the introduction of machine tools. Mechanical labour superseded handwork, and the artisan became a specialist, and latterly scarcely any men have been found to take the place of those who formerly, by their own hands, produced such exquisite workmanship. A lad now goes into a factory and is taught to work a machine tool. He obtains a thorough knowledge of this particular instrument, and can, by the skill so obtained, do a much larger quantity of work than he possibly could if occupied with every operation. This, however, is attained by the loss of his individuality as a handicraftsman, and the dryness and sameness of the work, which blunt any inventive faculty he may possess. Apprenticeship is no longer understood as it was fifty years ago, and not many workshops are really in a condition to instruct an apprentice in the whole work belonging to a trade. This is how the difficulty of obtaining managers and foremen has been brought about, and to remedy this in France the Commissions appointed by the State to make the inquiry unanimously recommended the system adopted in the *Ecole municipale d'apprentissage de La Villette*.

With this view of general professional tuition for boys and girls, the Commission also studied thoroughly the financial side of the question. It was evident from the first that a gradual procedure would be the best one, and consequently the method to be adopted had to be thoroughly considered.

The Commission having made a thorough preliminary inquiry, determined that all the industries carried on in Paris resolved themselves into two categories, which they termed mother industries and special industries. It appeared certain that in working wood and iron a rational course of theoretical and practical instruction, similar to that given at La Villette would enable a lad leaving that school to obtain employment

employment in several branches of industry, whereas such trades as tailors, hatters, and shoemakers are confined to their respective specialities. Therefore it is especially in the first class of industries—or mother industries—which embrace several trades having numerous points of resemblance, and which often employ an analogous class of work, and in a great manner the same class of tools, that apprentices become more and more rare; and this occurs without the master or director of the works having any remedy for the evil, as the most minute division of labour is necessary in order to compete not only with other establishments but with other countries. For these great industries, then, there was no method that offered so many advantages, and which so absolutely tended to raise the level of the artizan, as the schools of apprenticeship.

The Commission having thus grappled with the question, there still remained a difficulty to surmount, and this was that as manual work, or the handling of the principal tools had not been introduced into primary schools which would enable the masters to judge accurately in drafting boys from the primary schools, chance would necessarily play a most important part in recruiting the apprenticeship schools, therefore that the instruction so well organized would not give the results which might be expected if those who had the best talents for the work could be picked out from the others.

In the absence of all preparation at the primary schools, it is impossible to forecast which of the pupils are particularly adapted to mathematical science and mechanics, or which have artistic sentiment latent in their young minds. This inconvenience will be obviated so soon as workshops are attached to primary schools; and it is the opinion of the greatest authorities that these workshops would shorten the apprentice's time by at least two years. This in reality would add two years to the active life of the artizan; or supposing the average duration of the working life of a mechanic to be 25 years, then it would add 8 per cent. to the national work. This is a question worthy the attention of our statesmen and political economists.

The French Commission decided to group a certain number of trades in the same apprentice's school, and that during the first year these pupils should have the same sort of tuition, so that in a way their taste may become developed, leaving them free during the second year to devote themselves to a profession where taste is only required, or to that where precision is absolutely necessary.

In following out this idea, the Commission has proposed to establish in the faubourg St. Antoine a school of apprenticeship for making furniture; a school which, in teaching the various methods of working in wood, will turn out capable workmen—carpenters, builders, cabinet-makers, wood-carvers, chair-makers—and for the iron-work, that generally used in furniture, enabling the workman to be a locksmith in a general way, or in the execution of the artistic work which is employed in the iron-work of doors and windows of houses and public buildings of the best execution. The Commission thought in making such an experiment they would attain their object of creating the greatest number of high-class workmen in this extensive branch of Parisian industry. The various branches or particular trades are grouped during the first year, when theory is taught, and the manual exercises common to all, and permitting, in the succeeding years, the lads to choose those particular branches or trades to which their faculties, as regards science or art, are best adapted. This is really an example of what the Commission has defined a mother industry; and with respect to the conditions which should regulate



admission into these schools, it was decided unanimously that it should be gratuitous, but as far as capacity was concerned, it was debated whether entrance should depend on a certificate stating that the applicant had passed his school term creditably, or that a simple examination by the school authorities should be deemed sufficient. The advocates of this simple examination contended that intelligences varied, and that certain natures, and indeed the greatest number, ought to begin with the practice, and not by the theory; that to insist on a certificate of study would limit the number of applicants, and reserve the schools for the children of the well-to-do workmen class, whose parents could maintain them at school until they had obtained the necessary certificate. The gentlemen who held these opinions were, however, outvoted by the men who had occupied themselves in the study of primary instruction. These affirmed the beneficial effects a certificate of study would cause, setting forth that, if it were not deemed necessary, the emulation of applicants would be weakened, and the powerful stimulant it engendered would be altogether lost. It was therefore decided that all applicants should be certificated scholars of the primary schools.

With reference to the cost of this class of school, one of the Commission, a distinguished architect, thoroughly examined and reported on the subject. He found that to erect a suitable building for the apprenticeship schools, with the addition of lecture-halls and amphitheatres for evening classes, to give instruction to double the number of workmen and others not apprenticed, the cost would be from 1,800 to 2,000 francs (from £70 to £80) for each apprentice; thus, if the school were laid out to accommodate 300 apprentices, the cost would amount to between £21,000 and £24,000, and this in addition to the cost of the ground.

I may mention here that this Commission proposed to create three of these apprentice schools for boys. The tools approximatively will cost from 50 francs to 60 francs (£2 to £2 8s.) for each apprentice. The cost of keeping the school of La Villette shows the annual general expense amounts to £10 (250 francs) for each apprentice.

Concerning special industries, the Commission are of opinion that manufacturers themselves should take the initiative, and report that many proprietors of works have done so. Some have already erected in connection with their works, apprentice schools, while others have formed classes to teach both apprentices and workmen the science which underlies the practice of the workshop. Here also the state assists by subsidising, provided municipal superintendence is permitted and apprentices chosen who have passed in the workshops of the primary schools. As before stated, the commission has confined its attention to these three projects, because until the municipal authorities have decided to adopt and carry out these projects it would be useless to go on.

The first is a school for boys to learn the trades of making furniture and the ironwork required in furnishing hinges, locks, bolts, &c. The woodwork includes cabinet work, marqueterie chairs, wood-carving.

The second is a school for teaching generally wood and iron working, upon the model of the school of La Villette, but with additions permitting other trades to come in, such as stone cutting and setting, foundry work, carpentry for constructive purposes, roofing and plumbing, making, in point of fact, a school absolutely for teaching the trades employed in construction and house-building.

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The third school, which is intended for the centre of Paris, is for the purpose of teaching the trades when absolute precision is required, such as the apparatus required for telegraphy and other scientific purposes, clock and watch making surgical instruments, and all objects of this class.

These schools have not yet been established and some modification is proposed. Premises are to be rented and instruction commenced without incurring the very considerable expense of purchasing land and building new schools. Had the public finances been in a better condition the expense would have been incurred without demur or doubt, but in waiting for better times the professional instruction is to be commenced on the lines advocated by the commission.

I must mention another institution as an example of what is done by the proprietors of large industries in the way of special technical education. M. Chaix is the proprietor of a very large printing establishment in Paris, and in connection with his works he has established a professional school with a view of making clever workmen, without any idea of their becoming foremen or managers.

The apprenticeship is for four years, and boys are taught to be compositors, lithographers, engravers, and machine hands. Theoretical classes are held in the works by the employees of the firm—two hours daily for compositors and engravers, and one hour for stereotypers and machine hands. The practical classes are the different classes of work on the establishment in a room specially devoted to the apprentices, where they are attended by foremen charged with their instruction. Each month there is a competition between the lads of the same year, which is duly recorded in order to establish a proper classification. In this competition time, quality of work, and every essential element of appreciation are taken into account, for the great object is to form workmen who can perform their work quickly and well.

From the time the apprenticeship is commenced the lads receive pay—averaging 1 franc (10d.), 1 franc 75 centimes (1s. 5½d.), 2 francs 50 centimes (2s. 1d.), and 3 francs 75 centimes (3s. 1½d.) per day during the four years according to the respective years. Besides this pay to the parents of the lads, a fourth is entered on the books, and at the end of the apprenticeship half is given to the parents and the other half invested for the benefit of the apprentice, part of which he receives when he becomes of age. Besides this there are other advantages provided according to the work and conduct of the apprentice—a fund for aged and superannuated workmen, a life insurance, and also an insurance against accidents. To these funds a portion of the profits of the concern is contributed, thus making a sort of co-operation in the establishment, which induces an *esprit de corps*, productive of the best results. This system assures to the proprietors a class of workmen clever and capable, working quickly and well, with no incentive to strikes, which are alike detrimental to both masters and workmen, while from an economic point of view it is far ahead of any other system.

The professional schools of France, therefore, resolve themselves into three types, the first of which is Municipal, and is represented by the school of La Villette, the second by the school of Horlogerie (clock and watch making), created and maintained by the trade or guild, and the third that represented by the printing works of M. Chaix, and which is entirely maintained by those immediately interested, viz., the proprietors of the works or manufactories.

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The cost of tuition for the three years at the La Villette school is about 2,000 francs (£80), to which must be added the cost of keeping the apprentice during that time, which at 2 francs (20d.) per day comes to about 2,000 francs (£80), making altogether a total of £160, half of which is paid by the Municipality, and the other half by the parents.

The cost of the school of clock and watch making is about the same, although it extends over four years. The tuition costs 1,200 francs (£48), while the *nourriture* amounts to £115, or altogether to £163.

The cost of forming a workman by the system employed by M. Chaix is neutralised by the payment made to the apprentice, which, taking the mean of the four years, pays the parents for the nourishment of the apprentice.

The question as to the possibility of organising workshops in primary schools has been definitely considered, and the decision arrived at that it would be highly advantageous to do so, and the discussion which arose as to whether it should be conducted as the first step in a technical education, or a necessary complement of a national education was emphatically for the latter. It was seen at once that in a primary school the practical teaching of difficult trades would be next to an impossibility, as it would require workshops to correspond to all the principal trades; moreover, it would require schools of three or four times the accommodation of existing schools, and on leaving these schools the boys would not be finished workmen, as their youth and strength would be against them. They could only enter workshops as novices, and probably have to serve two or three years, thus losing the science they had originally been taught in their school, and unless they had a particularly kind master no account would probably be taken of their industrial preparation. For these and other reasons it would not be profitable to teach trades at a primary school. Moreover, it would be impossible to keep the boys there long enough, as another three years would be necessary to develop them physically. It is certainly more simple and far more rational to create establishments of a superior degree in which children can be further taught on leaving the primary school, and where for another three years they receive technical instruction and at the same time carry on their primary and scientific training. On leaving the technical school they have the strength and skill necessary to rank them as artisans, and experience proves that the youths of 16 from La Villette find ready employment at a fair rate of wages. They thus altogether escape the hardships which have to be endured by small boys in large workshops.

An experiment on a small scale was made at a primary municipal school in the rue Tournefort, at Paris, to teach children trades, which, while extremely interesting in an educational point of view, was found practically insufficient. Children could not be kept at this school after they were 13 years of age; they were neither strong enough or sufficiently expert to be employed in workshops other than as apprentices. Nevertheless, the experiment was useful, as it showed to what a point children could be brought forward in manual dexterity without interfering in the least with their intellectual studies. It seems, indeed, that the contrary is the fact, and that the increase of manual liability increases also the facility with which the child learns his ordinary lessons.

It is not, therefore, found practicable to teach trades in primary schools, but to generalise, and to teach that class of work which is common to all handicrafts, and of which every person is capable whatever may be his social condition—work  
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just sufficient to develop manual dexterity, and actually to take the place of amusement in the play-ground. This is not at all a question of theory. It has been applied in many Municipal schools, where it has immediately given results eminently satisfactory.

The work adopted as the most convenient is that which is the most simple in its character—the easiest class of carpentry and wood-turning. Of course, iron or other metal work could be taught in the same way, but there seems to be innate a sort of longing to use carpenter's tools, and in the first place this is quite sufficient to set in motion the constructive faculties, and to develop dexterity with the hand. These elementary exercises do not require large workshops or expensive tools, they can be easily taught in the play-sheds of public schools.

In France, where these exercises have been carried out provisionally, they have been voluntary on the part of the pupils, and have not interfered with the ordinary class work. Children under 10 years of age are not permitted to use tools, and those boys above that age have shown the greatest *empressement* to be allowed to work, and in working they show the greatest interest, giving their two or three hours to this instruction outside their ordinary classes, with the same hearty cheerfulness they would exhibit in the play-ground. In fact, it is simply carrying on the system of Froebel with object lessons for games, of a character that teaches manual dexterity, which will be of after use in the real business of life.

From the time the infant child leaves Kindergarten at the age of 6 (say) to the age of 10, when he is permitted to use tools, there is an interval of four years, the question therefore arises as to how the liability acquired in the Kindergarten can be carried forward during the interval. The solution of this interesting problem is being solved in France at the schools provided with tools, where the boys who are being instructed in their use employ them in the first place in providing the instruments of instructive games for their small comrades, and it is quite astonishing to see the ingenuity displayed both by the master and his pupils in this respect. The instructors have to be kindly patient, and they are well repaid by the attention of the child. It must never be forgotten by the teachers that the school is for the children and their instruction, and not for the teachers convenience; it has been established for the better development of all the faculties of the pupils, and automatic exercises too often repeated are not of the character to do this. There can be no doubt that instructors imbued with the true spirit of their calling are animated with a sincere desire to do their duty in every way, and will doubtless zealously forward the system inaugurated to the immense benefit of the pupils committed to their care.

It is a great truth that every nation is doing its utmost to develop the innate dexterity of its youth. Nor is this confined to those who are considered as the most highly civilized. Russia has long been in the field, and latterly Japan has been sending commissions to every other country to see what is being done, and learning what they deem necessary for their benefit. They see clearly with the price of labour in their respective countries that all they want is skill, and that this skill can be given in the quickest way by commencing with the child. In Russia, for example, where the silk industry has made such rapid strides, this has been studiously and thoroughly accomplished. They fear no competition in fabricating articles of the  
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most costly character, and the Government places a high import duty on all foreign goods. For the raw material they have to go to London and Lyons, but I am informed on the highest authority that they are beginning to trade direct with Japan and China, and are creating establishments that will lay the foundation of a great future trade with the entire East. Some of these establishments employ already from 1,000 to 2,000 workmen. During the last six years it is almost impossible to conceive the vast progress that has been made. It appears that the social organization of the Russian workmen, their character and temperament, give the masters an exceptionally favourable opportunity to succeed in their respective industries. These workmen are invariably recruited from the peasants in the agricultural districts, and travellers who have lately visited for the express purpose of reporting on their capabilities state that they are endowed with an exceptionally high intelligence. To the faculties of imitation and assimilation they are quiet and good tempered, very patient, and obedient to their masters, who must in order to succeed with them take care to exhibit firmness, decision, and absolutely fairness and justice between man and man. Excepting their love of drink, to which they religiously consecrate the Sunday, and which ordinarily confines itself to that day, they are sober, honest, and economical, living in common, and purchasing weekly rations for the community; their nourishment costs very little, and their clothes less. They camp in barracks attached to the factory, and during their industrial life, which lasts three or four years, and during which they save every rouble they can, they acquit themselves as good soldiers during a campaign, for their real home is some farm in the interior, which belongs to the family, and at which they spend every harvest. In fact the Russian workman, (says M. Marius Vachon), is the most perfect living machine, and under foremen, intelligent, patient, and competent, who knows how to show him his work and correct his faults, he learns thoroughly how to work a machine in a month or six weeks, and produces stuffs of exquisite elegance and delicacy. Their wages vary from about 2s. to 5s., the latter only given to the very best workmen, and M. Vachon says he has seen work which the best Lyonesse workmen would not be ashamed of. The employer has no dread of strikes, as all industrial establishments are under the surveillance of the police, and moreover the ease with which they can recruit any number of workmen from the teeming thousands of the agricultural population.

During the last ten years the production of silks, linens, and cottons have more than doubled and must go on increasing, and so also have the dyeing and calico printing trades. They also make furniture, all kinds of draperies, goldsmiths' and jewellers' work, paper, and indeed almost everything that is required by their immense population. This has been all brought about since the first great National Exhibition of 1851, or rather perhaps that of 1855, and the immediate means have been technical education of the very best class. Engineers have been turned out by thousands by the Government schools, of a character that it would be simply impossible to surpass, as they have been the pick of their secondary and superior schools, technically trained to do the most perfect work without any limit as to time or expense. The Russians became aware that as they progressed it was wise to manufacture for themselves, and they consequently set about it in the right way. They had at their command materials and labour in abundance. It was only necessary to transform this rude labour into skilled labour. There was no insuperable difficulty in this, only the time required to operate the transformation. They made every inquiry as to the proper means, and laid the foundation truly and well. No niggardly spirit was shown by the Government, no expense was spared. The question

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was to produce workmen, to create from the semi-barbarous inhabitants industrial armies. It was shown that without teachers it would not be practical to make workmen, consequently establishments like that under the directorship of M. Della Vos were instituted. The students on graduating at these superior industrial schools were each one capable of making a clever workman himself, and so it has gone on and will continue to progress until Russia is not only able to provide for herself, but, with her unbounded resources and numerous population, will, in another half-century, be in a position to supply the entire East. With roads, bridges, ships, and manufactories, and thousands of the cleverest industrial officers and workmen, they can do anything. They are not dependent on any other nation, and can, moreover, manufacture their own arms and ammunition. They have imported men from America, England, France, Germany, Belgium, and Italy for the express purpose of instructing them in all the arts of war and peace, and their own officers and *savants* never lose an opportunity of personally learning by voluntary active service wherever there is anything to be learned, either in military or civil engineering, or in manœuvring troops in the field. It is easy, therefore, to conceive the power and greatness that must inevitably result from such energy, perseverance, and sacrifice, and Russia is marching at this moment with gigantic strides towards the object of her ambition, and cannot fail to become the most powerful nation of the world. Already she has made herself independent of other nations both artistically and in works of skill and industry; nay, more, she rejects their work, for by the system of political economy adopted by the Russians they either entirely prohibit the importation, or place such an import duty upon foreign goods as to render foreign competition almost an impossibility. Russia is actively engaged in trying to secure for her market the commerce of the east, to which she has the most direct route by the Caucassian, Turkestan, and other lines of practical access, and over which they will soon construct railways. The historical affinity which exists between Russian and Oriental art must facilitate a rapid and complete assimilation of the various processes of fabrication, but with the traditions and tastes of the great Eastern people. It certainly is the design of Russia to obtain this trade, and it will require all the activity, energy, and audacity of the Anglo-Saxon people to retain it. This feeling towards the East on the part of Russia is ingrafted in the nature of the seas. It forms part of their poetry, their sentiment, and their religion. One of their distinguished literary men, M. Boutowski, writing with reference to the establishment of the Moscow Museum, says:—"The museum has for its chief object the desirability of bringing into exclusive usage the ancient Russian ornamentation, wherever art is required, so as to stamp the industry as absolutely Russian, and more especially to restore the art of the sacred iconography. This is of the greatest importance, and would exercise a most salutary influence upon all the Russian people in developing nationality and patriotism. All the work of the museum will not be accomplished solely by increasing the knowledge of the people in advancing the material progress of their manufactures; they must be inspired by higher objects; they must have a moral effect and a religious influence; they must aid us to follow the traditional historical development of our nation." It is clear that Russian authorities press forward towards the goal of their ambition. Commerce and manufactures are alone wanting, and under the flourish of M. de Boutowski's writing there is the underlying political inspiration of political mysticism. The people who come under Russian authority, whether by conquest or otherwise, are made to learn that Russia means to govern, not only in a military point of view, but morally and socially. She requires a strong and healthy bond of  
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union to cement her peoples and to make her one vast nationality, and she knows that national art is at once the most delicate and the most powerful both for this purpose as well as that of refinement. Russian art is the simple reflex of the temperament and character of the Muscovite, for in spite of all official attempts to transform its character, and endeavours to cultivate a taste among the people for what we may term European art, it keeps its originality intact, and its love for the wild images it employs in its decorations shows that the innate character is still not far from its original fanaticism and superstition. Russian art is eminently both religious and political, and its statesmen are endeavoring to make its influence felt over the whole empire.

In my report of 1879 on school buildings, I described at some length the school for engineers of M. della Vos. There are many other schools of a similar character for other trades and professions; in short, Russia, recognizing the facility of creating good workmen, embraced the opportunity, and she is now in a position to teach herself.

Some fifteen years since this national feeling took the form of a general movement of an artistic *renaissance*, chiefly promoted by a society of young architects of real merit, and all students of the Russian *Ecole des Beaux Arts*. These artists had for their aim the institution of pure Russian architecture. They were assisted and applauded by all the national newspapers and the professors of the various colleges. This movement became exceedingly popular and acquired all the significance of an intense political agitation. It was warmly taken up and patronized by the Court. The Emperor modified the costume of the army in accordance with the popular excitement, proclaimed that at all the Court balls the officials should attend in national costume, and gave the Court jewellers and goldsmiths orders for works of art designed and modelled exclusively after Russian types. Both the French and German artisans and *industriels*, which before this had command of the market, exerted themselves to combat this new departure in Russian art. Moreover, the workmen had not at that period gained sufficient experience and reliability, nor was the ground sufficiently tilled to take advantage of the seed sown in such a broadcast manner. The adaptation of Russian models was made without proper discernment or taste, the artists making use of designs in goldsmith's work which were adapted only to architecture or woven fabrics. The research of the picturesque was not understood sufficiently, and jewellery modelled in the Byzantine style is generally too massive and heavy to come into general use, and the preference for lighter work hindered the efforts made by the Court to restore the ancient types. Nevertheless the *renaissance* of Russian art has taken a firm hold, and the directors of Schools and Museums of Art and Industry have never relaxed their efforts, and are constantly exhibiting exceedingly precious original works by historical publications, and by the execution of work to serve as models for Russian work. There is no doubt that a great National School of Russian Art will gradually but surely establish itself, as the people themselves are patriotic to a fault.

Mr. Chas. G. Leland, of Philadelphia, says:—"The universal truth that man develops the ornamental before he develops the useful is illustrated in every individual during the infancy of the human race. The child who cannot as yet make a shoe, or fill metals, or master a trade, can, however, learn to design decorative outline patterns, mould

mould beautiful pottery, set mosaics, carve panels, work sheet leather, *repoussé* or emboss sheet brass. He or she can cut and apply stencils, model *papier-mâché* or *carton pierre*, inlay in wood, and make a great variety of elegant objects. If a child can learn to sew, sing, draw, and model in the Kindergarten, it can surely pursue higher branches—both literary and manual—in higher schools. The system on which this industrial artwork should be taught is as follows: It does not merely consist of certain definite branches, such as modelling or carving according to patterns—it is the learning how to design the patterns, and then working them out in any material, such as wood, clay, brass, embroidery stuffs, or stencils. There are fifty or a hundred such minor arts, and anybody who can draw or design can, with very little practice, in a few days execute them fairly in any substance which will retain impressions. It is a very remarkable law of nature—or of humanity—that all the minor arts, or such branches of industry as are allied to ornament, are very easy, and can generally be so far mastered in a day by anybody who can draw as to enable the pupil to produce a perfectly encouraging result. But industrial art to be taught in schools need not (and should not) be limited to ornamental work. This is to be at first followed, simply because it is the only work easy enough for children and girls. Carpenters' work or joinery in its rudiments, or, in fact, any branch of practical industry, may be taken up as soon as the pupil is fitted for it. Industrial art in schools covers the ground or fills the time intervening between the Kindergarten and the industrial school, but it blends with and includes the latter. It is characteristic in this that the system, as I conceive it, is capable of being introduced into every public or private school in the country, or into any institution where there is a preceptor who has some knowledge of drawing, with sense enough to apply it according to certain elementary handbooks of Art."

As a preparation for industrial art work it is necessary that the pupil should be able to design. Drawing is therefore the first step, and Mr. Leland claims that by his method of teaching it can be learned in much less time than is usually required, besides teaching at the same time the application of the art in practical work, so as to enable the scholars to earn a living at once, by making something that can be sold. From drawing a straight line the pupil proceeds immediately to outline ornament for decorative work. Tracing and the aid of the ruler are permitted, but are soon abandoned, and in a very short time a boy or girl of ordinary capacity can design beautiful original patterns, which are made to serve exclusively upon the work of the student. Only practical results are aimed at. Great importance is attached to freehand drawing, and it is taught with special reference to the studies of the school. The principles of construction receive some attention, but geometrical forms do not appear to be of much account in the plan of instruction, and perhaps it is unimportant to the purposes of the system. It is recorded that this school began its work in 1881 with nearly a hundred pupils, half teachers and half scholars. The children are from 12 to 15 years of age. Every teacher in the public schools selected one or two scholars. These are divided into two classes, one attending on Tuesdays from 3 to 5, the other on Thursdays at the same hour. When the pupils can make a fair original design they learn painting, modelling, carving, embroidery, or metal work. They are, however, variously occupied—some in painting *plaques*, or tiles, some in carving walnut panels, or in making brackets, doyleys, tidies, chair-backs, hammering brasswork and different kinds of sheet-metal, and again others in a variety of modelling, ornamenting and glazing clay-work, and the girls in designing patterns



patterns which they work in outline embroidery; and the work thus done is of such a character as to be suitable for decorative effect, and as can be readily sold for a good price in the market. The operations in modelling are taught in systematic treatment, and embrace a great variety of plastic objects, such as jars, vases, flowers, fishes, branches, vines and leaves, in which each pupil carries out his own design according to his own liking, and no uniform rule has been adopted, except that it must be original. The work in sheet metals and in wood carving gives evidence of skill even in those who have not practised it longer than a few weeks, showing that this kind of skill can be easily acquired by any child in the Public schools. Very excellent specimens in drawing are exhibited at the table devoted to that study, from the simplest forms up to well developed ornaments, and are afterwards successfully used on the material of their work. Art needlework is taught before plain sewing, as it is said to make the latter easier in the end. The art of stencilling, or flower-printing on cloth, is practised, the picture being surrounded by an outline of needlework, producing very saleable articles by means of their beauty. Practice in drawing and modelling, owing to its great variety, leads gradually to tempered beauty in original designs upon *repoussé* work, on carved wood, vases and jars, and in patterns for embossed leather, wall-paper, carpets, mosaics, inlaying, and articles of furniture, for the execution of all these may be entrusted to the pupils, and sold for their benefit.

It is stated that the outlay for a small school or club, on the humblest scale, is estimated at not more than 20 to 30 dollars. The School Board of Philadelphia appropriated 1,500 dollars in the year 1882 for the maintenance of the school, and it was confidently asserted that it can be made entirely self-supporting, if not profitable, by means of the work done by the pupils. One of the practical results of this class of technical teaching is that there is a great demand for boys with the knowledge acquired at such schools. Mr. Leland says:—"I could without exception find places in a great variety of manufactories for all the pupils in the public industrial school who have had about twenty lessons in design and modelling. \* \* In a few weeks all who have advanced beyond design produce work that has a market value."

The plan of this institution revives the art instincts of the people and utilizes them in numerous branches of remunerative labour. It deserves the fullest recognition for the careful and systematic advancement of industrial art, especially since it is a department of the public school in a city so largely engaged as Philadelphia in the interests of art industry. It has a practical value to thousands of children, as they become skilled in a great variety of hand-work, while it cannot fail to be a source of enjoyment and delight to those who have no need to earn a living, as there is scarcely a situation in life where a knowledge of these simple arts is not useful, besides being a source of happiness to all who practise them.

The Central Institution of the City and Guilds has for its object, in the words of the programme, to give to London a college for the higher technical education, in which advanced instruction shall be provided in those kinds of knowledge which bear upon the different branches of industry, whether manufacture or arts.

The institution is intended to afford practical, scientific, and artistic instruction, which shall qualify persons to become (1) technical teachers, (2) mechanical, civil, electrical, chemical, and sanitary engineers, architects, builders, and decorative artists, and (3) principals, superintendents, and managers of manufacturing works. The main purpose of the instruction to be given in this institution will be to point out

out the application of different branches of science to various manufacturing industries, and in this respect the teaching will differ from that given in the universities and in other institutions in which science is taught, rather for its own sake than with the view to its industrial application.

In order that this instruction may be efficiently carried out, the institution, in addition to the lecture-theatres and classrooms, is fitted with laboratories, drawing-offices and workshops, and opportunities will be afforded for the prosecution of original research with the object of the more thorough training of the students, and for the elucidation of the theory of industrial processes. Courses of instruction are arranged to suit the requirements of—(1) Persons who are training to become technical teachers, (2) persons who are preparing to enter some industrial or professional career, (3) persons who desire to attend special courses with the view of acquainting themselves with the scientific principles underlying their work. Students are required to pass an entrance or matriculation examination, which will include pure and applied mathematics, mechanical drawing, physics, chemistry, and French or German. Besides courses of lectures and demonstrations on special technical subjects, courses of lectures and laboratory instruction are given to technical teachers and others during the month of July, and registered teachers of the institute are admitted to these courses without payment of fees. The director reports the attendance at these courses to have been satisfactory, as showing that the teachers of the institute, many of whom come from remote parts of the country, are eager to avail themselves of the opportunities of improvement now brought within their reach.

In applied art the department was organized partly to meet the wishes of the numerous cabinet-makers, who petitioned the institute that courses of study should be arranged that would be adapted to this industry, partly because it was thought advisable to affiliate to the Finsbury Technical College, the city school of art originally established as a school of design for the Spitalfield weavers, and partly because no technical college is complete which does not provide its students with art instruction. In assisting the cabinet-makers of the neighbourhood, this school will doubtless prove of great benefit in the development of this important industry. For although, cabinet-making is one of the art industries in which the English may be said to hold their own against foreign competition, it is nevertheless a fact which may not be generally known, that foreign designers and foreign workmen have been and are frequently employed on some of the best work executed by English firms.

A theoretic knowledge of principles in addition to manual dexterity becomes every day more and more necessary, for with the progress of modern invention, the extension of science and consequent demand for altogether, novel machinery and instruments of precision, the handicraftsman is no longer the development of the apprentice, even if apprenticeship were what it once was. Every year brings forth demands for machinery and instruments of new types, necessitating a practical skill and scientific knowledge unknown and unasked for twenty years ago. Clearly the object and general aim of technical teaching is to provide the necessary increased skill and science to meet these novel requirements. A great authority says that technical education is taken to mean a general instruction in those sciences the principles of which are applicable to the various employments of life, and all manual instruction in arts and manufactures, whether given in the school, the factory, or the workshop. It is, as some authors have it, a general instruction in science,  
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and in the application of the principles of science to industry, in the application of scientific principles to the operations of different trades and manufacture—neither pure science nor mere manual work. Lord Shand says:—"The workman, if he is to be successful in anything beyond mere simple handiwork, must not only be acquainted with the principles of science, which are applicable to his work, and ready and efficient even in the mere manual part of his industry, but he must be able with intelligence to apply his scientific knowledge in carrying out the different operations and processes of his manufacture."

The originators of the Watt Institution and School of Arts in Scotland appear to have had a correct view of the subject, for it was founded for the purpose of enabling industrious tradesmen to become acquainted with such principles of mechanics, chemistry, and other branches of science as are of practical application in their several trades, that they may possess a more thorough knowledge of their business, acquire a greater degree of skill in the practice of it, and be led to improvement with a greater security of success.

It is not intended to teach the trade of the carpenter, of the mason, the dyer, or any other particular business; but there is no trade which does not depend more or less upon scientific principles, and to teach what these are, and to point out their practical application, will form the business of this institution. These views of technical education are certainly sound, and give a fair view of what an applied science school should be. Professor Perry defines that "technical physics is the application of the principles of natural philosophy to particular trades." When a boy enters a workshop, however good may be his knowledge of the principles of natural science, he cannot readily understand all the operations going on about him. He must be taught the application of his knowledge to the particular trade. This application of his knowledge is really a higher study of physics. Technical physics is simply advanced physics, so advanced that the boy becomes a specialist. All his future life is that of an experimental physicist, who is attaining a greater and greater knowledge of a particular part of his subject.

I have seen myself, under the guidance of Sir P. Magnus, the system of teaching adopted at Finsbury, under the direction of the Council of the City and Guilds Institute. This grand institution supplements technical instruction wherever it finds good opportunities. Sir P. Magnus says that "One of the determining causes which have guided the council of this institute in the organization of their scheme of technical education has been the desire to supplement where it seemed deficient without duplicating the existing educational machinery. They have consequently regarded primary instruction, which is the basis of all education, and is now happily cared for by the State, as outside their sphere of action, and they have left to local efforts, supplemented by such aid as may be elsewhere obtained, the provision of higher elementary or intermediate schools, the want of which is now generally experienced. Acting on the same principle, they have endeavoured to utilise the science-teaching so extensively encouraged by the Science and Art Department by supplementing it with special instruction in technology; and this department of their work, which is represented by their system of technological examinations, has already taken root in all the large manufacturing centres of the country, and has been the means in many cases of establishing well organized and properly equipped technical schools. This system of the City and London Guilds is not intended to supersede manual work, the teaching of the hand and eye, which

is certainly found in the workshop or the factory in a more satisfactory manner than in the usual schools, and the training in the workshop should run concurrently with the teaching in the schools. The science taught is first general, and then special. The student must first learn the scientific principles, such as are given in the ordinary courses of physics, chemistry, or mechanics, afterwards advancing to practical instruction bearing on the special trade he is acquiring out of school. Individual teaching here, in a considerable measure, takes the place of lectures, and, in short, the student becomes a specialist, applying the principles of the science he has been taught to his particular avocation.

The City and Guilds scheme or system makes provision for pupils and students at the different stages of beginners, apprentices, and workmen, and also for the more limited number who aspire to become foremen, managers, and directors of industries, and also of those who intend to become teachers in technical schools.

The programme of the Finsbury Technical College is as follows. It states that it has for its objects the education of:—

1. Persons of either sex who wish to receive a scientific and practical preparatory training for intermediate posts in industrial works.
2. Apprentices, journeymen, and foremen who are engaged during the daytime, and who desire to receive supplementary instruction in the art, practice, and in the theory and principles of science connected with the industry in which they are engaged.
3. Pupils from middle-class and other schools who are preparing for the higher scientific and technical courses of instruction to be pursued at the central institution.

There is also a day school attached to this college which represents really a new grade of school in the British educational system. According to the distinguished director of the institute, it is not a technical high school, like the polytechnics of Germany and Switzerland, in which professional engineers, manufacturing chemists, architects, and technical teachers are trained, and in which a wider and more exact knowledge of theoretical science is imparted to the students, and demanded from them as a condition of entrance. On the other hand, it is not a school in which any actual trade is taught, except it be some art industry, in which taste and skill and knowledge of the capability of the material in which the work is to be executed are the main conditions of success. Nor is it a school like the apprenticeship schools of France, which, notwithstanding much that has been said and written in their favour, are not generally regarded by experts on either side of the channel as the best means of training workmen or foremen, and are certainly not in accord with the conditions of industrial success of this country. It is, however, a school in which workmen desiring to become foremen will have the opportunity of supplementing the training of the shop by receiving practical instruction in the principles of science in their application to the industry in which they are engaged, and the evening department of the college has been specially organized with the view to their requirements. But workmen will not learn in this school that rapidity of execution which can only be acquired in the factory or workshop, where, under the severe strain of competition, saleable goods are manufactured.

The day students enter the college between the ages of fourteen and seventeen, but they must not be less than fourteen. They should previously have received

received a sound English education, and have acquired an elementary knowledge of mathematics, physics, and chemistry, as well as some familiarity with the French and German languages.

They are also required to bring a certificate of good conduct from their former school, or other testimony of a good moral character.

With the view of indicating the kind of education that should be given in schools of a lower grade from which students will be received into the college, the council requires that the pupil shall be required to pass an entrance elementary examination in mathematics and English. The former will include arithmetic, algebra, as far as simple equations, and geometry, as far as the subjects of the second book of Euclid.

The courses of instruction are arranged to occupy at least two years. On entering, the student will state whether he wishes to be trained as a mechanical engineer or an electrical engineer; whether he wishes to be educated with the view to some branch of technical industry or of the building trade; or, finally, whether he desires to study applied art. In any of these cases, except the last, he will find mapped out for him a complete course of study, occupying about seven hours a day, and involving laboratory instruction, tutorial work and attendance at lectures, exercises in mathematics, mechanical and freehand drawing, instruction in the workshops, and lessons in French and German. The hours of attendance are longer than in most English schools; but as a great part of the student's time is occupied in practical work, some of which exercises the hand and eye rather than the brain, the mental fatigue consequent on longer hours is not likely to be excessive. On the contrary, the alternation from brain work to physical work, which is a part of the system of education adopted at Finsbury, is calculated to lighten the burden of theoretical instruction, whilst it affords training to bodily organs, which in other systems of education are not at present sufficiently exercised.

Sir P. Magnus says also "that the separate curricula comprise instruction in subjects having a direct bearing on the industry which the student proposes to follow. Whilst the utilitarian side of education has been kept steadily in view, no subject having been included in these curricula a knowledge and an ever-increasing knowledge of which the student will not find it desirable to possess, the methods of instruction adopted are such as will at the same time stimulate and develop the reasoning faculties of the pupil. The instruction will be technical in so far as it refers to the career of the student; but it must not be supposed that because it is in this sense technical, and consequently strictly useful, it is therefore less disciplinary. One of the yet unsolved problems of education is to discover subjects of instruction which a school-boy in after-life shall not cast aside as unprofitable, either for the purposes of his daily work or recreation, and the teaching of which shall have the same disciplinary effect as that of other subjects which for so many centuries have been the sole instruments of education. In Finsbury College this problem has been fairly solved by teaching science with this double object; and we may be certain that whenever methods of science teaching shall have been elaborated and generally approved which shall yield the same mental exercise as classical studies have hitherto afforded the present system of school instruction will everywhere undergo an entire change."

The special features of Finsbury Technical College, which mark out this new departure in educational work, and distinguish it from other schools, are, first, that as an educational institution it is intermediate between what we are accustomed to regard

regard as a college and a school. The instruction afforded is that of a college, the discipline that of a school. A definite course of instruction is laid down for each pupil, and this course, if properly pursued, is intended to give him a wide and cultivated acquaintance with science and art in its relation to the industry he is to follow. No narrow view has been taken of the educational requirements of the student; and in this respect the college curriculum is a protest against the opinions of those who see a practical antagonism between mental culture and technical training. One great advantage of this kind of instruction is that the pupils attending the courses laid down for them will be educated, in the true sense of the word, at the same time as they are undergoing a special training for the real business of their life. Those who have a correct appreciation of the scope and aim of technical education rightly speak of it as the borderland between the school and the factory. It is such. Adopting the methods of the one, it familiarizes the student with the processes of the other. It enables him imperceptibly to pass from books to work, and to apply the theories of the former to the practical details of the latter. Whilst students in each department of the college receive the same class of general instruction, the amount and character of the practical instruction they receive depend as nearly as can be ascertained upon the pupil's future occupation. Thus, all students learn mathematics, mechanics, physics, chemistry, and mechanical drawing; each student will be chiefly occupied with the laboratory work connected with the department which he enters, and his lessons in mechanical drawing will be specialized with a view to the trade for which he is being trained. So that should a student show more aptitude for physical than chemical studies, or the contrary, the student will be able easily to pass from one department of the college to the other, and his previous studies will be nearly or quite as useful in the new department which he enters. Importance is also largely attached to the rule that instruction in French and German is obligatory on all students who are not already conversant with these languages. These lessons constitute the only literary training the student receives in the college. It can readily be conceived how exceedingly valuable these lessons are, not only as making them elements of a liberal education, but from the power it will give students of ascertaining for themselves through the scientific journals of France and Germany the progress and position of the industries in which they are specially interested.

In all the departments, except that of chemistry, where the laboratory practice occupies twelve hours per week, every pupil is required to spend a certain amount of time in the college workshops in gaining some acquaintance with the manipulation of wood and iron, and with the nature of the tools employed in working these substances. While the workshop is thus brought into the school, there is no attempt made to teach the different trades. Pupils thus gain a knowledge of materials, and the use of ordinary tools, and the different machines that are now found in almost every workshop; so that whatever may be their future occupation, they will have acquired a certain amount of hand-power that cannot fail to be useful in whatever position they may be placed.

The evening classes according to the programme are intended for apprentices, foremen, and others, are more especially adapted to the requirements of those who are already engaged in specific industries. The students of these classes can ascertain from the head of each department, the courses of instruction best adapted to their several trades. These industries or trades, to which the present course of instruction at the Finsbury Technical College specially apply, are :—Mechanical engineering,

engineering, electrical engineering, industries involving applications of chemistry, the building trades and cabinet-making, and other art industries. The courses of instruction are so far as possible arranged to meet the requirements of persons preparing for other occupations, as well as of apprentices, workmen, and foremen engaged in other trades not comprised under these headings. With reference to these evening schools, Sir Philip Magnus says: Workmen generally make a great mistake in taking a very narrow view of their own educational requirements. Instances of this are continually coming under my notice. It is difficult, for example, to make them understand that a knowledge of intimately associated and cognate branches of their trade is likely to prove serviceable to them,—that in order to become efficient foremen it is necessary that they should possess an intelligent and comprehensive acquaintance with the entire area of the work in which they are engaged. It is partly to correct the cramping influence of the extreme division of labour that technical instruction has become necessary. Speaking from my own experience, I should say that workmen generally care to learn in the school little more than they might learn in the shop,—they only want to learn it more quickly. This desire of workmen to learn those parts only of a subject which seem to them to be intimately connected with their special occupation, reminds me of a fact told me by a medical friend,—that among his students of anatomy was one who expressed his decided unwillingness to dissect the abdominal cavity, because, as a surgeon, he intended to devote himself exclusively to diseases of the eye. This narrow view of the scope and objects of technical education needs to be steadily and persistently discouraged, and it is one of the objects of this college to bring home to the workman the advantages of a wider and more comprehensive system of instruction.

In France, Belgium, and Germany, the views of the workmen take a wider scope. The class-rooms are well filled every night in the week with young men who steadily work at the courses of instruction to which their trades assimilate. It is to be confidently predicted that, as technical teaching becomes more extended and systematized in the United Kingdom, the same interest will be taken in it as that which prevails on the Continent, for the classes that have been established at the Finsbury Technical College have been arranged with special reference to meet the educational requirements of the mechanic, the electrician, the metal-plate worker, the cabinet-maker, the carpenter, the bricklayer, the plumber, and many others, with a view to supplement, without interfering with his workshop training. Young artisans are encouraged to pursue these studies at the college at merely nominal fees, and it is pleasing to know that no less than 761 individual students attended these evening classes, being an increase during the year of 150 individual students. Much has been spoken and written on the subject, and it is a question beset with difficulties. Giving skill to the mind is not so easy as giving skill to the hands, and in the opinion of a great many authorities, by doing both at the same time is the correct way of solving the problem.

To accomplish both these objects at the same time would be to kill two birds with one stone, and is really what is most to be wished. Rudimentary education, we are all aware, does not fit a man to receive that thorough and accurate scientific education which those who are to be directors, masters, managers, and foremen of great manufactures and industries require; but by giving the practical at the same time as the theoretical instruction I believe most material assistance would be given to each, and that both classes of knowledge would be attained in less time than either taught separately. It is therefore, in the first place, highly necessary that  
rudimentary



rudimentary science teaching should be commenced at the earliest stage of primary education. The most distinguished authorities have long since come to the conclusion that industrial training, or the training of the hand and eye, and thereby the mind, is a powerful and invaluable element of education, and must be taught from the child's earliest days. It is not necessary to teach trades, but ordinary handwork and the minor arts. Industrial work can easily be devised for every age, and such training must begin where there are no Kindergartens in the primary schools continued in the grammar schools. This training does not hinder or interfere with other studies; in fact, wherever it has been fairly and honestly tried it has been found that the work, both in the school and workshop, has been done better than either would have been done if carried out separately. Therefore technical handwork should be carried out in all schools, as manual and intellectual dexterity are equally necessary to the welfare and safety of any state. Thus technical instruction and handwork, with tools of a general character, prepare children for a variety of trades; but it must always be borne in mind that a knowledge of freehand drawing is absolutely necessary in the first place, and this should be taught from the earliest period. It should be commenced at the same time a child is learning his alphabet. If the teacher drew a letter on the blackboard, and instructed the infants to imitate it on their slates with a bit of chalk, and then told them what they had made was the first letter in the alphabet, they would not only be learning to read the alphabet but to write it and to draw at the same time. This seems to me to be the foundation of the whole matter; and I am confident the child would learn to read faster than by any other system, although he was simultaneously learning to write and draw with equal facility.

All the distinguished practical educationists of the present day have been impressed with the necessity of introducing the teaching of hand work in the rudimentary instruction of youth. Rabelais, Montaigne, Coménias, Locke, l'Abbé de Saint Pierre, Rousseau, Condorcet, Salzmaun, Pestalozzi, and Froebel, all perhaps of different opinions and different periods, have been entirely in accord upon this point. It can easily be shown by statistical facts, that in direct proportion to its industrial skill so is the wealth and power of a nation. While with industry and economy hand work is always pre-eminent, so with idleness and extravagance it decays, and the decadence begins to show itself strongly when young men show a disinclination for handicraft trades, preferring to pass their lives on office stools or behind a counter. Manual skill and mechanical art give form and permanent expression to vague and indefinite impressions, imagination, invention, memory, and emotion are brought into play by the exhibition of skill in handwork; the images of external things are conveyed to the mental faculties, and the mission of our physical organs is to work out the thoughts, impressions, and inventions created in the mind. How different occupation such as this, to standing behind a counter and selling yards of calico. How noble when compared with the other. Look at Quentin Matsys working at his anvil; Cellini at his modelling and his furnace; Watt and Trevethick at their steam engines, and old Geordie Stephenson at his locomotive, and tell me whether these men are not far more noble in their way, been the means of diffusing more happiness, and done more material good to the world than all the traders and dealers. Hand-skill leads to industrial inventions, and whatever metaphysicians may say about the world being governed by ideas, common sense teaches that ideas are without power until they are changed to deeds by the means of man's industry. Power may exist in the mind, but it is latent, it is without influence, while



there is yet no executive capacity, and this must be carried out by means of the physical organs, and chiefly by the hand and eye, and the technical skill of the fingers. It has been well said that the hand is a remarkable example of sinewy power and muscular delicacy of touch; and when its skill co-ordinates with the eye and the will, many of its acts impress us with profound admiration. It produces results so fine and delicate, that it seems as if the spirit itself passed into the variously-formed objects of its exquisite perfections. The hand intellectualizes the body, and in a certain sense the mind itself is dependant upon it. All fineness of work comes from its wondrous adaptability for technic skill; and while it is to the eye that we owe our perceptions of form and colour, the hand transforms these perceptions into visible objects. "So much," says a recent writer, "does the power and dominion of man over inferior animals, crude materials, and natural forces depend upon the hand that, were it possible to deprive the human race of this important member, and put in its stead a mere paw or hoof, it might well be asserted that man would soon find a common level with the beasts notwithstanding his superior intellect." Without its manipulation, where would be the comforts of civilized life? Montaigne says it has even a language of its own. "Would you think it," says he, "with our very hands we require, promise, call, dismiss, threaten, supplicate, deny, interrogate, admire, number, confer, repent, fear, confound, doubt, instruct, command, incite, encourage, swear, testify, accuse, condemn, absolve, affront, despise, defy, provoke, flatter, applaud, bless, humble, mock, reconcile, recommend, exalt, entertain, rejoice, complain, refuse, despair, wonder, exclaim, keep silence, and what not; and all this with a variation and multiplication even to the emulation of speech." Outis declares the great void in education was a training of taste, eye, and hand in behoof of beauty and expression,—that the whole human creature should be cultivated, and not merely the intellectual portion.

That manual work must be taken into account, and form a portion of any advanced educational system, is acknowledged by almost every nation in the civilized world. Its effect upon the social condition and happiness is incontestable, for in its train competence and contentment alone are found.

The work of the artisan invariably necessitates much application. Long hours of work, and many and sustained efforts are necessary in order to make any kind of object or instrument or machine. Those who will not work hard can never attain to any superiority; and this fact cannot be hidden either from others or themselves. The child with *amour propre*—and where does the child exist that has it not—will always endeavour to do his work as well as his schoolmates; he has always in this feeling a happy stimulant, while at the same time he acquires the habit of application. His attention will be continuously attracted by the necessity which always exist for him to study the smallest details of his model, and this habitude when once taken, forces him forward in the class, in order to keep his place in matters of general education. Taste is developed in a large measure in these first exercises in hand labour. The master insists on having the work well finished, pointing out gently and carefully to his pupil where improvement can be made, and showing the necessity of working until the object has attained the form and elegance that it should have. The pupil's imagination is stimulated to produce models of his own by the liberty given to work out his own inspirations, which encourages him and stimulates him to new exertions. The eye is also taught by the part it takes in the work. The pupil finding himself always working from his

his model, whatever it may be, contracts the habitude of forming a correct judgment. He accustoms himself to observe correctly. He enters into the smallest detail of form and dimensions, and after having thus analysed the material phases, he applies his investigating qualities to intellectual matters. Besides this, hand work has the same effect upon the body as gymnastics. It developes muscular force in forcing the child to take up in accordance with his work so many and varied positions. He therefore satisfies at one and the same time the approbation of the hygienist and the schoolmaster. It is therefore necessary above all things that hand work is commenced at the earliest period. In the Kindergarten, the *Ecole Maternelle*, the *Ecole Infantini*, and in the primary school hand work should be more or less cultivated; and the more it can be cultivated the better for the child, both in the dexterity he acquires with his hands and the stimulus it gives to his intellect. This has been borne out by all modern teachers, as well as by those great spirits whose works and whose lives originally solved the problem. When the teacher of hand work in primary schools has directed the manner, and rendered more practical the direction such work takes in the different pupils in making manifest the tendency towards any particular trade, there cannot possibly fail in the future development a better workman. Habituated from the tenderest age to the handling of the tools of his handicraft, he must of necessity have attained to a certain amount of technical skill; and as the trade is his choice, he will love it, and it will become a pleasure to him to excel in its more difficult manipulations. He will have a proper pride in his work, and as a consequence it will be always well done.

Moreover this will be done in less time. The young man at 18 will be as good a workman as he would have been under existing circumstances at 21. There will be thus three years saved to the State; and allowing the time a man is able to work at his trade at thirty years, it would increase by one-tenth the producing power of the State in this respect. Let us take England for example. She has an enormous number of artisans. One-tenth more would mean a money value which would more than compensate for any sum the State might expend in technical schools.

Then again, what an immense benefit it would be to the colonies for its imigrants to have acquired this dexterity at hand work. He would want no instruction in making for himself a comfortable house and home in the wilderness; and what a pleasure it would be for him to make little articles of furniture for extra comfort and refinement. He would have his workshop, his bench, and his forge, and would be always able and ready to do any little job that may be required, whether to mend his plough, put a link in a trace-chain, or a spoke in a wheel. It is impossible to predict the immense advantages that would be gained by the State, or the increase of comfort and happiness to those who make a home in distant settlements, and to whom the use of common tools is such an enormous advantage. But trained to hand work in primary schools the problem is solved. The necessary dexterity of hand is early acquired and never lost. The time necessary to become proficient in any given trade is very much shortened. Habits of morality, order, precision, attention, and application are inculcated. It gives greater number of skilled artisans to our community, men who love the work for the work's sake and not from necessity. It prepares young men to be proud of the fact of their being workmen, proud to say that they can live by the work of their own hands; and what really is greater than anything else, it fights successfully against the pestilence which exists

exists and from the effects of which so many nations and people suffer, viz., the growing feeling that hand-labour is not sufficiently respectable.

When people have learned that the industrial training of their children is the perennial fountain of a country's prosperity, and prefer trade and technical schools to prisons and work-houses, and school rates to poor rates, their idleness will be suppressed and ignorance cease to exist. Real will take the place of ideal instruction, and this education must be suited to the condition and wants of the people. Much has already been done in this direction by all the nations of Western Europe, and I have visited the countries and the schools wherever I have thought there was anything to be seen or learned that would be of advantage to my country. I shall endeavour, in as concise a manner as possible, to place the various systems of technical instruction before your Excellency, together with their respective curricula, which will be found in the Appendices. The present position of technical education can then be ascertained upon the direct evidence I have compiled, and which I trust will be thoroughly studied and considered by all who take interest in this vital question.

The Nääs Normal School for the training of teachers in hand-work for schools is situated near the Floda station, in the district of Elfsborg, in Westergötland, Sweden. It was founded by M. August Abrahamson, the proprietor of the Nääs Estate, who has also endowed it with a quantity of land, buildings, &c., besides a sum of 200,000 crowns, in order to ensure its existence. Mr. Salomon, the director of the school, is the son-in-law of Mr. Abrahamson, and is one of the first and most fervent propagators of manual work in primary schools. In conjunction with the founder the director has carried forward this grand work with the greatest enthusiasm. Their wise lessons cannot possibly be studied without appreciating the important results that are achieved from the teaching of hand-work in primary schools.

In order that the master of a school where hand-work is taught may be capable of fulfilling his duties, not only is it necessary that he possesses the requisite qualifications in the practice of this class of work, but it is also necessary that he should be able to communicate this knowledge to his pupils. This normal school has, therefore, to form its pupils from two points of view—(1) from a technical standpoint, and (2) from the standpoint of the science of teaching or a pedagogical view.

Under the head of technical knowledge it is evident that not only must the master dedicate himself to hand-work in a greater degree than an instructor, who has to teach a great variety of other matters. This latter might content himself in acquiring only a passable dexterity, whilst the professor of hand-work must possess in this respect a real superiority. But this superior dexterity is rather in respect to the quality of the work than the quantity.

The future masters of hand-work for employment in the primary schools ought to be taught to make simple objects of a practical utility, and not a high class of furniture. Capable men, who have thoroughly examined this subject, say that it is highly important to make useful articles in the primary schools. Children who are able to offer their parents some little useful article made by their own hands, display in their work a courage and pride which are constantly asserting themselves, besides the emulation of trying to make it as well as the best of their schoolmates. This spirit is never displayed when simple operations are performed on pieces of wood, which

which are afterwards thrown away. The authorities at Nääs are very firm upon this subject. They say to proceed differently would be as illogical as to teach foreign languages in a normal school to the neglect of the mother-tongue. Experience has proved that workmen are often found who are complete cabinet-makers, but who are incapable to shape with proper method models destined to be copied in the primary schools. It is necessary also to consider the question how to form men whose vocation will be to teach how to make these simple objects, for it is an indisputable fact that the natural feeling of teachers, who are always artistic in their tastes, is to think it is derogatory to teach that which appears to them too elementary. The authorities at this school also say the considerations are various which have decided them not to allow anything to enter into the list of things made in the school but those of the most simple form and quality—things which are used in the simplest houses among the working-classes, and these are taught in a logical gradation. More difficult work is not systematically excluded, but toys, or any kind of luxurious work, are absolutely inadmissible.

The students of this school are also taught how to do simple forge work and how to use a file.

The theoretic teaching at the school is all that is necessary for the future master as a teacher in a primary school.

Conformably to the principles of Pestalozzi, which taught that arithmetic was the foundation of all order in the mind of the pupil, an important position is given it in the curriculum, as it is not only considered as a general means of instruction, but it exercises and fortifies the intelligence. Physical science, with laboratory experiments as much as possible, is taught, as this study demonstrates the regularity and order which reigns in the vast domain of nature.

Linear design, which is the inseparable aid and support of manual work, is practised upon a considerable scale. Drawing renders firmness to the hand and exercises the eye in forming a correct judgment; it grasps the grace of symmetry and the delicateness of details. It is moreover considered as an excellent means to inspire good taste by means of order and exactitude, and teaches habits of precision and propriety. At Nääs pupils copy exclusively models of the natural size.

It is considered highly important that those who are destined to direct the study of others should know how to express themselves correctly, and not expose themselves to censure in the violation of the rules of grammar either in speaking or writing. Therefore as much time as possible is given to the study of the mother tongue.

It is also the same in other matters, such as writing and singing.

In order to give to the future teachers of hand-work a high idea of those functions which they are required to learn, they are to follow a course of pedagogy which treats of education in general, and hand-teaching in particular; the master should know how to teach in the best manner the different faculties of the programme. Practical exercises where the initiative is left to the student accompanies both theoretical and pedagogic teaching.

The courses of this school occupy the year, or 42 weeks of from 53 to 55 hours of lessons in each.

The object of hand-work is that children should acquire a general dexterity in the use of the different tools of the carpenter, the turner, and learn to make, in a simple

simple and progressive manner, utensils and tools of the most rudimentary character, it includes forge work and the use of the file. The students are taught the following subjects :—

Hand-work	...	...	...	...	...	32 hours per week.
Calculation	...	...	...	...	...	3 „
Geometry	...	...	...	...	...	1 „
Physics	...	...	...	...	...	3 „
Linear drawing	...	...	...	...	...	6 „
Swedish language	...	...	...	...	...	2 „
Writing	...	...	...	...	...	1 „
Singing	...	...	...	...	...	2 „
Pedagogy	...	...	...	...	...	1 to 3 „
Method	...	...	...	...	...	2 „

In order to be admitted to this school the applicant must be over 20 years of age, to be in possession of all his physical faculties as well as mental, to possess some knowledge of hand-work, and to be furnished with a certificate of his having passed the usual primary course of education and good conduct. On leaving his examination is at the same time theoretic and practical; it serves to establish his knowledge of arithmetic, geometry, physics, Swedish language, in pedagogy, and in method, and shows his aptitude in linear drawing and in hand-work. A *viva voce* lesson upon a given subject shows the degree of his capacity for teaching. When the result of this double examination is favourable, the trained teacher receives his diploma signed by the director of the school. The students receive their tuition free as well as their lodgings. They can get their board supplied for about 20 crowns per month.

It would appear the country who had the honour of first making hand-work part of the curriculum of the primary school was Finland, and it is to Uno Cygnaeus that the merit is entirely due. In his youth Cygnaeus had been sent by his father into many workshops, where he acquired a certain amount of dexterity with his hands, and some time afterwards he was much struck by what certain philanthropists had stated when advocating hand-work as a means of education; he thereupon set to work to study Froebel and Pestalozzi, and saw clearly how hand-work might be made part of a system of general culture. He understood that to develop the perceptions of form and of a taste for the beautiful, children might be made to acquire a certain amount of dexterity. He found it necessary to introduce into the school occupations that, contrary to the gifts of Froebel, would satisfy the wishes of older pupils. According to Cygnaeus it is not so much a question of attaining a high degree of dexterity in various branches of work, or to perform such work as well as a professional tradesman, but that the children should learn to serve themselves with their own hands, to do their exercises and work methodically, and with order, propriety, and precision, while also serving the purpose of recreation.

With respect to this latter, according to the Finland teacher, the exercises were to be considered serious and not taken as pastime, but rather to serve as a real means of education, and that the teaching was not to be confided to artizans without any knowledge of pedagogy. The hand-work in the workshop ought to occupy the same rank in importance as the other subjects of the programme, and to be taught by persons specially prepared for their task of teaching by the institutor himself. These teachers having acquired at a normal school both theoretical and practical knowledge,

knowledge, were obliged first to have a correct intelligence of the manual operations as a means of education, and secondly, to learn to work with his hands in order to direct the workshop annexed to the primary school.

It was with this conviction of the importance of handwork in the schools—a conviction which had animated him since 1840—that Cygnaeus undertook in 1858 that pedagogical tour with which he had been charged by the Government of Finland. He visited Sweden, Denmark, Germany, Austria, Holland, and Switzerland. Everywhere he advocated his projects of reform, and insisted upon the great necessity of handwork as a means of education. Not desiring to appear before the public, he preferred intimate circles of persons interested, before whom he would develop his educational schemes, which very nearly resembled those of Froebel Pestalozzi and Dlestuarey. In 1861 he was appointed inspector of primary schools, and in 1863, director of the normal school of Jyväskylä, and then Cygnaeus was in a position to put his ideas into practice. The Act of 1866 relating to the organization of primary schools in Finland is, without doubt, the first official act which places technical handwork among the compulsory subjects taught in primary schools. This proves that handwork in schools is appreciated in Finland in a manner equal to other matters of teaching, and the tutor ranks with the schoolmaster. In the normal schools, and in the greater part of the primary schools, the programme of exercises includes carpentry, turning, stonecutting, blacksmith's work, tinsmith's work, and basketmaking.

In Norway handwork was introduced as a part of the school programme in primary schools, but did not meet with much success, and in Denmark it has not yet been fully developed. The Danish Government has, however, subsidised it by an annual grant.

The measures taken in the north to improve handwork in schools was made known to Germany by the Exhibition of 1873. It needed, however, all the ardour and energy of Captain Clausen Kääs to bring the Germans to see the great advantages of this new class of teaching. In 1875, Captain Clausen Kääs held conferences in many of the large German towns and was lucky enough to attract the attention of the public to his subject. In 1876, a society for the promotion of domestic handwork was formed under the presidency of Professor Gneist, of Berlin. The aim of this society was altogether an economical one. Two masters were sent to Denmark to study the application of the new system, and in 1878 a school of this class was established in the capital. In 1880, the Prussian Minister for Public Instruction gave proof of his interest in this practical work by appointing a commission to proceed to Sweden and Denmark to make an inquiry and report upon the new system. In North-western Germany the attempts made to introduce this handwork in schools have been crowned with good results. Saxony possesses schools of this class at Dresden, Leipzig, Chemnitz, and other large towns. A normal school has been established at Friedrichstadt; Bavaria, Wurtemberg, and Baden have also their handwork schools in all their large towns; and as most German handwork teachers have been trained under Captain Clausen Kääs' system his method predominates; but there are many schools whose teachers have graduated at Nääs.

The law of 28th March, 1882, rendered hand work compulsory in all primary and normal schools throughout France. It will, however, require several years before their dispositions will receive general application. A normal school has been organized at Paris, from which instructors will be turned out charged with this class  
of

of instruction. The Minister of Public Instruction, in order to make himself thoroughly acquainted, appointed a commission to make an inquiry and report upon the best methods.

Austria, Hungary, Holland, and Belgium have followed, all fully recognizing the importance. In 1883 the Belgian Government sent M.M. Sluys and Van Kelkan to Sweden, in order that they should follow the courses of Kåås. Their report was full and complete, and their conclusions in every way favourable to the Kåås system. The Belgians have experimented with the Swedish method in several schools in Brussels with excellent results. In the United States of America the system has been already organized in the primary schools at Boston.

The great object of teaching manual training in the primary schools is to inspire in the child a taste and love for work, to make him feel the importance, the necessity, and the advantages of order and exactitude, to understand the necessity of attention, application, and perseverance at the same time as he acquires a general dexterity of hand. To comprehend the sense of the term general dexterity, it is important not to lose sight of the difference there is between manual training and learning a trade. Manual training consists in occupying the pupil in such a way that he may acquire the hand-power and use of tools necessary to give him this general dexterity for the purpose of making or repairing such objects and implements as are useful in the common usages of life. A trade, on the contrary, develops a special dexterity for the manufacture of certain articles which are determined upon, and makes part of the category which forms the trade. The first of these is the domain of the school, the second belongs to the workshop. A primary school will avoid all development of a simple mechanical character, but will teach the acquisition of a general dexterity by a well organized system of instruction. The capacity of occupying oneself with useful work is ever an honourable duty to those who possess it, while, on the contrary, its absence is invariably regretted by those who are deprived of it. It is necessary that the school which has neither the power or the will to occupy itself with anything besides reading, writing, and arithmetic, history, and natural science, should extend its operations to the elements of manual training. The result of this application of manual training consists not so much in the acquisition of a large amount of dexterity, but only with what we should call sufficient dexterity to perform the ordinary kinds of manual work. This dexterity will give to those who possess it a facility to use their hands whenever it is necessary, a very useful quality in practical life, not only to the artisan, but to every man, no matter what may be his social position. Well directed manual training inspires its pupils with the love of taste for work. Everyone may remark there exists in all children a constant desire for activity, a necessity of movement which obliges them to be always doing some kind of work. Even with the baby of a year old, we can already observe that it wishes to do something with its little hands. When it finds anything within its reach it immediately seizes it to throw it to the ground, and recommences these movements when the article is picked up and again given to it; and this will continue as long as the nurse has patience to satisfy its caprices. He examines his toys intently, and if he finds the means of breaking them, nothing will persuade him that it is not right to do so. As he advances in age he finds other distractions of the same kind. He builds with pieces of wood, makes houses and carts; he digs canals in the sand, and arranges little gardens. In short, it is clear that there is a lively independent activity forcing him forward to make some figure, in order to represent

represent the things of which he has an idea. The intelligent educator, the clever teacher, takes advantage of this actual activity in order to direct the child to apply himself to make something useful. By these means play changes itself to work. The work produces a result that can be foreseen to be at once certain and useful, and which cannot be carried out without giving a certain amount of pleasure to the pupil. The child always finds great satisfaction in making something both useful and durable. The hope of seeing this result, and the power to make it, increase the pleasure and application of the little workman. The objection might be made that in the primary schools the children are always at work, and that instruction, properly so called, is an occupation as well as manual training. This is true so far, but this kind of work differs very essentially from the other as regards the standpoint of the promptitude of results. Manual training produces an agreeable and useful result almost immediately; the result of study, on the other hand, is only seen in a vague and distant manner. A child learns his lessons not because he has any pleasure in doing so, not because he acquires the possession of knowledge, nor because of its utility, or the advantage he will derive from it in the future, but simply because he is told to learn. He occupies himself with manual training in a very different manner. He applies himself with ardour, courage, and pleasure, because the result is fairly seen, and obtained with only a short delay. It is not, therefore, an Utopian idea to pretend that manual training inspires a taste and general love of work, because it is everywhere apparent that the love of action is inherent. There is, however, a consideration that not only merits a serious examination, but which must be carried into effect, and that is in placing manual training in the same rank as other studies, in according it an equally well recognized place in the programme of primary school teaching, in raising its importance by according it this position, until a reaction is brought about against the scorn which is attached too often to manual labour in connection with the domain of the useful arts. The scorn which produces an impression against handicraft trades, and necessarily brings about consequences which are not to be desired in the social harmony which ought to exist in all schools and among all classes. Manual training is founded on the pedagogical principles which require habits of order and the spirit of exactitude being required by the pupils. Experience shows that an intelligent child will try to do his work as well as possible, and that this desire increases in direct proportion as he acquires ability. If the models which are given him to copy and reproduce are proportioned to his ability, and the means at his disposal, the child will at once easily comprehend that it is only by proceeding with order, method, exactitude, and regularity that he will be able to construct, by means of his tools, any regular object, and that without these qualities—that is to say, by acting lightly without plan or method—there will never be anything but a defective result. It is necessary, however, to point out, in passing, that every kind of work will not produce this end. It is essential that the master, without any direct aid, without making the object himself, should inspect its progressive development, and examine with attention the work performed; then he will be able to explain to the child the defects of his work, while at the same time he indicates to him its cause and remedy. Every clever master knows that good progress is not possible with inattentive pupils, and all masters should be careful for the future of their pupils, and endeavour by all possible means to engage the attention of their scholars. The character of the teachers may be judged as well as the degree of their cleverness and ability to teach by the power of exciting and sustaining the attention of their pupils. Experience shows that manual training is one of the surest and best means to assist in the acquisition of



habits of application and attention. These qualities are absolutely necessary to give the work in execution its appropriate form, and bring it to a satisfactory completion. Constant attention becomes thus more and more a habit, which exercises its influence for good in the ordinary studies of the pupils, as well as in the workshops, by the actual concentration of their ideas. By manual training the pupil will not be long in learning that application and perseverance are the necessary conditions in order to arrive at any real success. The necessity of these qualities is not shown in so evident a manner in any of the other branches of study or work of the ordinary classes. A lazy child, but otherwise intelligent, may reply to questions in certain conditions better than a studious but less intelligent one. It is not the same, however, in making or constructing an object. Real work alone produces a definite result. More or less awakened intelligence will not suffice for the production of work, but the courageous and persevering pupil will finish his work, while that of the idle one remains unfinished. This circumstance deserves to be remarked, and may be made to act most efficaciously on a lazy pupil, as it may awaken him from his torpor, and stir up a spirit of rivalry within him, because among all children emulation has a most remarkable and salutary effect. Each child desires not only to do as good work as his school-fellow, but to excel him. This proves the necessity of giving to manual training the same importance which we give to other studies in the primary school. It is to make use of it as a means of general education that it is necessary to accord it a proper place in the programme of our schools. This point must be insisted upon, and it should be well understood, that this instruction should not be introduced into the primary school except as a means of education. It is not to make it a commercial work, or an immediate preparation for a trade, but chiefly for its truly pedagogic principles. It may be said that as a means of general education of the faculties, those faculties which have a definite aim, obtained indirectly from the interesting results of education in general, arithmetic for example (which has for its object the study of the rules of arithmetic), develops the intelligence, fortifies the judgment, and teaches order in the arrangement of our ideas. In the same way, manual training must be used as a means of general education. The primary school ought to give this kind of instruction, while it avoids all combinations and speculations which are opposed to this great object. It has already been said that to teach manual training, should not be to form an handicraftsman, nor is it to give the child a trade, but it ought to serve to teach the development of the physical qualities of the child, as well as the moral and intellectual ones. The study of a trade is the business of the professional school, or of the regular workshop. It is important to clearly understand the difference of these two classes of instruction, because even when established in the same way their direction and organization are entirely different. After these general considerations it will be necessary to examine in a detailed manner the conditions which appear indispensable in the installation of training, with due regard to its pedagogic principals in the primary schools. First, in a special manner the qualities of the master must be considered; secondly, the matters of instruction; thirdly, the pupils; fourthly, of the workshop; fifthly, of the time necessary to devote to it; and sixthly, of the tools used and models of the work to be undertaken; and we will also detail the method that has been followed at the normal schools of Nääs.

The experiments which were made at the end of the last century in the employment of manual training as a means of education, were not crowned with success. The principal cause of this check is easy to explain. The pedagogical aspect of the question was completely ignored and neglected in appointing teachers, which were simply handicraftsmen,

handicraftsmen, or tradesmen. It was impossible for these men to acquit themselves well in imparting instruction of this kind. Accustomed to see nothing outside their trade, they simply considered the school the same as a workshop, and the pupils as apprentices, whom it was necessary, before anything else, to make clever workmen. Every educationist will at once comprehend the barrenness of this procedure. In all instruction, in order that it may become useful, it is necessary that it should contribute to education or culture. Instruction and education ought not to produce contrary results, but unitedly to attain the same end. Education ought to elevate and instruct, as instruction ought to instruct and elevate. The great teacher and philosopher Herbart said, "I don't know how to conceive an education separated from instruction, in the same way that I cannot admit that instruction can ever be given without elevating the pupil." It is precisely the capacity of associating these two functions in an intimate and reasonable manner to instruct and to elevate which distinguishes the teacher from the artisan. The artisan only occupies himself with the technical part.

In a school where education is neglected, the establishment cannot be expected to distinguish itself long. All instruction given in a school ought to contribute, more or less, to culture, and it will readily be admitted that manual training is one of the great means destined to achieve this end. It is the natural consequence therefore, that masters, teaching this subject, must possess pedagogical knowledge. The great obstacle which opposes itself to the diffusion of this instruction does not consist in providing the means for carrying out the object or the necessary time for the work, but it is brought about by the difficulty of finding competent masters capable of directing the classes. This capacity must be found in the teacher of the primary school.

When it has been definitely resolved to confide the care of this instruction to the teacher there appears to crop up at once a crowd of objections. Men, otherwise well-intentioned, pretend that to teach manual training is to lower the class of the teacher, to reduce him to the grade of an artisan, and to convert the school into a manufacturing workshop. They say no instructor who feels his proper position and the dignity of his vocation will ever consent to work with the saw and the plane. Others add that the teacher has already too much to do to think of adding other matters to his programme; and even if he were willing to impose this sacrifice upon himself he would not have either the time or the technical knowledge, so his good intentions would therefore be useless. Though these objections have been fairly answered before, they must be replied to somewhat briefly in order that they may be better understood.

In the first place the master may want the taste for teaching manual training. The taste which one feels for a certain class of instruction naturally depends upon individual dispositions, which are very variable. To acquire a certitude with reference to this subject it is necessary to gather together all opinions on this point, after having interrogated each individual. Conclusive circumstances prove that this want of taste is nothing like so rare as it is said to be. The favourable opinions announced by a number of teachers, and the resolutions taken among reunions of teachers, the energy with which the matter has been taken up by various members, the instruction and organization classes, and the constant increase of the number of schools where manual training is taught, are facts which are a sufficient reply to this objection.

The

The word "slöjd" has no exact equivalent in the English language. It means work with the hands and with simple tools. It is an old national word, coming from an epoch when nothing was known of any tools but hand-tools. It does not mean any handicraft or special profession, but in speaking of a field labourer, for example, it may be said of him that he is a slöjdare, which means that, while he is simply a labourer, and not an artisan, that he is able to repair the tools and implements in use on the farm, as well as to work in the fields.

This simple work was originally taught to the children by their parents, but the desire and the aptitude were lessened as factories sprang up, making cheap articles of metal or ware to replace these simple wooden articles which had before been made by the various members of the family, with the simplest tools, while chatting round the fire during the long winter evenings. This continued for some time, and then the State found that the labourer was no longer a slöjdare. On the 6th December, 1872, the superior administration instituted an inquiry, and every district had to report as to the position of the slöjd. It was found, out of the twenty-four divisions of Sweden, only in five did the inhabitants possess the habitude of slöjd sufficient to satisfy the requirements of the authorities.

Slöjd has been applied in Sweden to those schools in which the use of tools for the purposes of domestic industry is taught. Schools of this class appear to have had their origin in Sweden, for although the honor of embodying this class of instruction undoubtedly belongs to Uno Cygnaeus who formed schools on this principle in Finland, but the slöjd, the hand-work united to the primary school in one actual development, belongs exclusively to Sweden. When, for the first time, it was contemplated to teach hand-work, it was only looked at from an economical standpoint. In different parts of the country complaints were rife that this kind of work, for which, time out of mind, the Swedish peasant had been noted, was fast disappearing in the country districts. In former times it was the habitude of the peasant to make and repair everything in his own family—most of the furniture, utensils, tools, &c., necessary to his housekeeping were made at home during the long winter evenings; and in some families many articles of woodwork were made for sale. As it seemed that the desire and the aptitude were fast diminishing to fabricate these articles, it was feared that a considerable source of production and consequent wealth would be lost to the country. On the 6th December, 1872, the Superior Administration ordered the District Governors and the Economical Societies to make detailed reports upon the situation. The reports showed that out of twenty-four districts only five retained anything like the habitude and custom of this class of cottage labour. Among the causes that had contributed to the decay of this domestic industry were cited—the development of factories and great works, the importance always increasing of agricultural occupations, the taste for lectures and attendance at the primary school.

In nearly all branches of industry simple tools had been replaced by machines; the division of labour had diminished the cost of production so much that the necessary utensils for the housekeeping, &c., were sold at such moderate prices that it had become scarcely worth while to make them. The peasant found it easy to procure, for a small sum in money, an article that had formerly cost him a large amount of labour. Not only had the large proprietor introduced new methods of culture, with new and improved implements, but the small farmer also desired to improve his method of working, so he really had not the time for other occupations.

occupations. To these two important causes was added the task for lectures. The instruction of the people being more developed than formerly, it was natural that the workmen should wish to improve their intellectual condition. Whether the object of these lectures was to improve the mind, or whether it was only to get the news from the newspapers and reviews, it was clear these occupied an important place in the leisure of the working man, and all this, however good in itself, was to the detriment of home industry. Religious agitations, taken up warmly by both peasants and labourers, also absorbed a considerable portion of their leisure time, and the primary school having been charged with the education and instruction of children, parents cared less than formerly to give their young families practical and moral occupations.

When we speak of handwork exercised in the family it is necessary to distinguish that which has for object to make and repair the tools and utensils necessary for housekeeping and that which manufactures these objects for sale. The first only employs the leisure of the peasant, especially during the long winter months; the second becomes a means of livelihood, and tends as much as possible to raise the prices of the objects which are made. In the first case the peasant only occupies himself during his leisure time, and most certainly everything he does is profitable; in the second case it is impossible that domestic industry can compete with the organization of work, the division of labour, and the lessened cost of production consequent on the manufacture of articles on a large scale. It is not, therefore, to be desired that this home industry should take the place of manufactories where it would have to compete with improved machinery. The great enemy to home industry is laziness and incapacity to perform any manual work whatever, and it is the great desideratum to bring about another state of things by teaching how to work by the hands. All efforts must be concentrated to give manual work our respect and esteem, as well as to develop a desire and capacity for work. The higher the status we give this class of labour the more good we shall do in raising the condition of the workman. The peasant should always have sufficient skill to keep in repair the ordinary tools of his work, especially the common implements of agriculture.

The first schools of manual work were created in 1870. I am aware many special establishments had for a considerable time before this introduced the subject into their programme, and taught their pupils elementary lessons in carpentry and smith's work. These were not at first very successful, because the directors had adopted a method that neither suited children nor workmen. This error was soon seen and corrected, and the teaching was made much more practical. Common efforts from the partizans who advocated the measure entirely from an economical view, and the others who looked at it in a pedagogical sense, resulted in a great success, and strictly united manual work to the primary school. The marvellous results obtained in a pedagogical sense soon made the economical view little thought of. It was soon understood that instead of employing manual work in the school to form the tradesmen, it was necessary to use this class of instruction to educate men. This idea was not, however, new. It has been known and spoken of for over a couple of centuries. In studying the works of the most distinguished educationalists, and of those philosophers who have exercised considerable influence in the development of human education, it can be easily seen that these great men recognized manual work as a means of education, not only authorized by pedagogical principles, but

but necessary to the normal progress of a well constituted society. For example, the Austrian, Amos Commins, who was born in 1592, and died in Amsterdam in 1671, said:—"It is necessary that children learn the most useful trades, whether it be that they should not be altogether ignorant of what passes in a practical life, or whether it be to show the direction of their natural dispositions." Locke, the great Englishman, who lived from 1632 to 1704, says:—"I have, however, something else to say. I know very well that in making known my thought, I run the risk of appearing to forget my subject, and all that I have previously written upon the subject of education, because I am going to speak of the necessity of a trade, and I have not pretended to educate but those gentlemen whose condition does not appear compatible with that of a trade. However, I do not hesitate to say that I would like any gentleman to learn a trade; yes, a handicraft trade. I would indeed that he knew two or three, but more especially one particularly."

Mr. Henry Cunynghame, who has made a most profound research into the question, says that the decline in the apprenticeship system is due to three causes, which he defines as follows:—"In the first place, the apprentice rarely boards with the master—the factory system has rendered that impossible; and increased means of locomotion have raised the number of apprentices who live with their parents. In the next place, society is now so large, and trades are so scattered, that an apprentice can easily run away from one master and enter the service of another; so that it is hardly worth while for a master to expend pains in teaching him his trade. Moreover, the factory system creates a demand for half-educated lads, and by offering wages which appear high to boys of 18, induces them to leave their masters just when they are learning most, and on the way to become accomplished masters of their craft. The result is that formal indentures are now becoming rarer, and boys generally commence to learn a business by entering a shop at 5s. a week, which is an insufficient equivalent for the board and lodging that was once afforded them." He goes on to say:—"There are other causes which also operate in the same direction. In the factory no provision is made for teaching—the master chiefly desires human machines. If he develops skill in a boy he will soon be met with a demand for higher wages, or a threat to leave and carry away some of the secrets of the workshop. It is, therefore, rarely the interest of masters to do much towards teaching apprentices. On the other hand the men have a direct interest in doing still less, for each apprentice, when taught, becomes a rival whose competition aids in lowering wages. Therefore we find that trades' unions and societies, so far from facilitating the teaching of apprentices frequently try and limit their numbers. The sole idea of parents is too often to get the boy to bring home as much money as he can to help the household; and consequently, when the question arises whether he shall go on at a low wage in the place where he is really learning, or leave it in order to obtain a higher wage at a place where his instruction will no longer be progressive, every home influence is exerted to induce him to take the latter course, to the ruin of his career as a skilled artizan. And lastly, the boy himself has rarely, at the age of 19 or 20, sufficient judgment to resist the alluring prospect of earning 20s. or 25s. a week, and being enabled to marry and have a home of his own."

As for the argument that manual training will lower the class of the teacher who has spent so much time in normal schools and training colleges in the acquisition of the necessary knowledge for the ordinary programme in primary schools, it is both  
ignorant

ignorant and useless, and those who think so utterly degrade themselves in making use of it. Where is the intelligent man who would have less esteem for the teacher because he knew how to occupy himself with manual work? No handwork, however modest it may appear to be, can ever dishonour anyone who is occupied with it, whatever may be his intellectual culture or his social position. On the contrary, it is highly honourable to be able to render oneself useful not only to oneself but also to one's fellow man. There is only one thing to be ashamed of and that is to live an idle and vicious life. No teacher, in whatever high esteem he may be held, or whatever his functions, can be believed for one moment to degrade himself in alternately working with his hands and mind. These prejudices will not stand in the way for any length of time as obstacles to the success of the good cause. The courageous and estimable Swedish teachers have always readily occupied themselves in this instruction, and at the present time there are 600 schools in Sweden where manual training is taught.

Then it is said the teacher has not sufficient time to occupy himself in manual training. This objection is certainly the greatest of all. There can be no doubt that the teacher has multitudinous occupations which are very fatiguing. It is not only to teach various and abstruse matters, but it is necessary that he should augment the sum of his acquirements and prepare for his daily teaching. Considerable time is occupied by the inspection of the children and the care of personal matters. But with a little good will it would be easy to accord several hours in the week to manual training. This is the way it is put by M. Salomon:—"The six working days of the week are composed of 144 hours, and in giving eight hours a day for repose, that is forty-eight hours a week, there rests ninety-six that one is able to consecrate to work. The school classes absorb thirty hours a week—let us have the same amount—another thirty hours for arranging the studies and lessons of the scholars; there would then remain thirty-six hours; and out of this thirty-six we will only take six hours a week for increasing the teacher's knowledge in manual training. But the question has, in reality, been solved over and over again, and, as a matter of fact, hundreds of teachers have proved not only that the thing is possible but that the results obtained have powerfully aided the instruction received upon general subjects."

The want of ability in the teacher has also to be considered. No man can teach more than he knows; but it is evident that by industry he can set himself to acquire the knowledge he does not possess. There are certainly aptitudes and a general adroitness necessary for manual work; but it should be remarked upon this subject that it is not necessary for the instructor to attain a high degree of perfection in order to be able to instruct. If it were a question of making clever carpenters, turners, or wood-carvers, it would then be necessary for the master to possess the qualities of an accomplished artisan; but this is not the proposed aim for this instruction in the schools. The teacher has no need to be a distinguished naturalist to teach the elements of agriculture or horticulture, or to explain the phenomena of physics, or the combinations of chemistry; he has no need to be a great artist to direct a drawing class; and it is exactly in the same light that we must regard the teaching of manual training. The teacher ought, however, to be able to awaken and sustain the attention of his pupils, to inspire them with a love of order, to teach them the necessity of order and exactitude, and, in short, to make them acquire a certain amount of dexterity useful to whatever may be the conditions

conditions of their existence. It is just this amount of knowledge, and no more, that is required for this new class of instruction. It is easy to see that it is quite sufficient for the master to possess the general principles of manual work in order to attain the end that is proposed to be attained by the adoption of manual training in the primary schools, and this is our earnest conviction. If he knows the names and employment of the various tools, and how to make a certain number of very simple objects himself, and to class these objects in a methodical manner, he need have no fear of being unsuccessful in this instruction.

The next thing to be considered is how the teacher is to acquire this dexterity in order to be able to direct the work of the pupils in a proper manner. The answer is obvious; the teaching should be organized at the training college. There can be no doubt that this would be the most logical as well as most efficacious method. It is at the normal schools that the importance of this instruction would be made clear to the future teacher, and to do this while obtaining the instruction necessary in pedagogical matters. If there is no normal school in which to train the teacher it will be necessary to organize special classes.

These innovations have given rise to many objections; but the difficulties to be surmounted will not hinder a general organization being formed in the future, and we shall be in a better position to profit by the experience acquired in the superior normal schools, as well as in the numerous training classes that have been established. We are persuaded that the addition of this special work to the other subjects of instruction at the normal school, cannot be otherwise than advantageous to the general progress of study. Technical instruction requiring physical effort, alternating with brain work, cannot but have a favourable influence on the intellectual faculties both moral and physical. The manual exercises will give repose from the fatigue of study, will develop the muscles of the body, will give the necessary exercise to the body, while the pupil acquires that dexterity which will be useful all his life long. This work should neither surpass the forces of the master or those of the pupils, but will on the contrary procure that training which is necessary to good health, and bear out the views of a distinguished writer who says that "variety of work is actual repose."

The normal schools of Finland, and particularly that of Jyväskylä, which have been established twenty-two years, and the schools of Carlstad, in Sweden, prove the accuracy of these observations. The want of general organization is especially prejudicial to the uniformity of method. It is necessary that the teacher should gain his knowledge by private study, or by attendance at the special classes established in various localities in Sweden for the purpose.

These classes, when assiduously followed, have considerably advanced the knowledge of teachers who have taken part in them, and have not been without their advantage in general education. To demonstrate the aim which is proposed to be established in the course of manual training, we would wish to report upon that which has been followed, during the last summer, at the normal school of Nääs. The classes commenced on the 19th of July, and lasted until the 23rd of August, that is to say, during five weeks. Twenty-four teachers took part in them, namely, three of whom were French, three German, two Danish, one from Finland, fourteen Swedish, and one female teacher of the same nationality. The course was divided into two sections, one of which was theoretical and the other practical. The theoretical part was in charge of the director of the school, and consisted of a certain  
number

number of lessons designed to establish the principles of manual training, its origin and development; the necessary means to effect this, and to impress upon the mind the direction to take in order to make the instruction educational, together with the mathematical foundation upon which it should rest. Three conferences a week, and various reunions for the discussion of these subjects, served to communicate to the teachers the pedagogical as well as the essential social principles which should always prevail at the organization of the normal school. The technical part was confided to the care of the professor of manual training, assisted by two young colleagues who were at one time pupils of the establishment, and consisted in making fifty different models of objects properly classed and chosen with the idea of making the teachers careful and dexterous in the use of tools, and to fashioning the wood in the construction of the objects in a proper manner. Anyone who has seen and followed the working of this course attentively cannot but be astonished to see the progress of the teachers and the results attained. Masters who knew nothing of the subject, and who had never done anything in this kind of work before, were able to use the tools with dexterity after a very short time, and imitated the models fairly well in the production of the desired objects. After five weeks they are able to show a fair collection of work, good enough to be used as models for the pupils in their respective schools. Experience therefore has absolutely proved the incorrectness of the views of those who pretend that teachers are not capable of acquiring sufficient dexterity to carry out the necessary instruction in manual training. As before stated, it is not a large amount of dexterity that is required, but sufficient dexterity to enable a man to use his hands in a proper manner for useful work. This most useful quality for men of every condition, is especially necessary to the teacher who has the charge of bringing up children; and it has been positively proved that the ordinary teacher neither wants taste, time, nor capacity to undertake the teaching of manual training in primary schools. His general culture in pedagogical knowledge, and his ability to teach eminently assist in making this instruction a means to increase his general education.

M. Salomon gives some interesting statistical information, which had been previous to this gathered. In 1877 a circular was addressed to the Swedish teachers, asking amongst others the following questions:—First—Are you acquainted with some branch of manual training, and if so, will you state the branch? Second—Are you disposed to teach it? Third—Will you use your influence to contribute towards teaching manual training in the primary school? The number of circulars addressed to individual teachers was 3,363, of which 1,563, that is to say  $46\frac{1}{2}$  per cent., were replied to. The result was, that 597 masters were acquainted with some branch of manual training, while 820, or  $52\frac{1}{2}$  per cent., were without practical knowledge, and 146 teachers never replied to the questions at all. As regards the second question, 463 masters were disposed to teach the work, 185 had no intention of doing so, and 318 never replied to this question. In short, the opinion of the masters upon the subject of introducing this class of instruction into the primary school, showed us that 1,090, or  $67\frac{3}{4}$  per cent., desired this without any conditions; that 19, or 5 per cent., admitted its usefulness with certain restrictions, while 239, or 15 per cent., replied in the negative, and 155 never replied at all.

These figures, which are eloquently conclusive, may be modified in a much more gratifying way. Intelligent philanthropists who have interested themselves in this study have followed with great attention the increasing movement which, during six years, has brought about the most notable ameliorations. Clearer and more



precise ideas have been applied. Greater activity and greater reflection have been displayed in the number of classes established; and an amount of experience has been gathered by this very useful consultation, which could not possibly have been obtained in a more expeditious or simpler manner.

After the proceeding demonstrations it will be seen that the teacher ought to be considered as the natural instructor of manual training; but it may happen that an absolute incapacity, or an insurmountable repugnance may hinder him from undertaking this class of teaching; or the school may be taught by a female teacher. Under these circumstances it is necessary to intrust the manual training to persons outside the school; but no workman ought to be allowed to occupy himself with this instruction until he has received instruction in the art of teaching. It is essential that this education should not be confided to ordinary workmen until they thoroughly understand the aim which is sought in teaching manual work, and the grave responsibilities attached to the functions. Those whose primary education have been neglected must not be employed, because a low intelligence, and the want of a moral sense of the duties, cannot give anything except a mechanical and machine-like character to this class of work. Considering with what facility the memory and the mind of the child receive and preserve impressions, be they good or bad, and contemplating how easily their natural sentiments and dispositions take either a good or an evil direction, it is astonishing more discretion and discernment are not used in the choice of a teacher. How many are there, whose lives have become vicious and criminal on account of the improper education they originally received? It is evident the responsibilities are in a direct proportion to the consequences; but it is a remarkable thing that while the importance of the functions of a teacher are well understood, and all the world comprehends that the two factors which produce either a happy or an unhappy future, are the family and the instructor, that notwithstanding this knowledge the choice is often made in a very careless and perfunctory manner. In practice, the field of education is considered as being open to the first comer; and men who would hesitate about giving advice to the gardener in the cultivation of plants, or to the blacksmith on the manner in which he shapes his iron, have not the slightest hesitation in expressing opinions on pedagogical questions to which they are complete strangers. They forget that only those who possess special knowledge are able to give a strong and vigorous instruction with proper method, and a useful education on a sure foundation.

An ancient author said, "The more I learn the more I become convinced that I know nothing." A good teacher, a sincere schoolmaster, may say in his turn, "The more I study the field of education the more I am convinced how immensely difficult is the task to cultivate it. The poet Tegner says, "Those who instruct ought to be considered artists, because they exercise a liberal art; and moreover, a liberal art which is the most elevated and the noblest that I know."

What applies to the teacher in general may also be applied to the master of manual training. He too has need of those qualities, and the pedagogical knowledge, so necessary for the successful teaching of youth. We know very well that the limited time young people pass at the training college is not sufficient to make them accomplished masters; but even their short sojourn there, well employed, is sufficient to make them understand the great responsibilities with which they are invested.

In order to be able to illustrate the utility of the principle that is here brought forward, and to demonstrate its application, I will give the programme of the studies that have been made during the last two years at the normal school for manual training at Nääs. There are at this school five or six courses of study during each year, designed to give the teachers of primary schools every facility in acquiring the knowledge that is necessary in the practical work of manual training, or to enable them to extend the knowledge that they have already acquired in this subject. Each of these courses lasts for six weeks. They are attended by Swedish and foreign teachers from various countries. A conference is also held every day under the direction of M. Salomon, to discuss matters connected with pedagogical knowledge. Besides this, there are frequent reunions of teachers, where ideas are exchanged in a conversational fashion amongst themselves as to the particular methods, &c., employed by different individuals. It is not rare to find very pronounced divergencies of opinion among the propagators and enthusiastic admirers of manual training. On the one side it is stated that several kinds of manual training should be taught, while the other thinks it should be restricted to one branch only. The one side advises concentration, the other prefers diversity.

Manual training, considered from a pedagogical standpoint, can only be organized in two manners: either by employing, as a means of general education, all kinds of work, or by restricting ourselves to only one kind. In the first place, M. Salomon thinks it is completely superfluous to embrace several kinds of work when one will produce the same results; in the second, it is necessary to suppress those kinds that are the least efficacious, and only conserve those which comprehend the exact qualities that are required.

After what has been previously stated, it is easy to see that it is necessary to confine ourselves to that class of industries which have much in common. This system is the only practical one in primary schools, where the great difficulty will be, for a considerable time at least, to find suitable masters, convenient workshops, and the necessary material.

Let us now consider the general qualities that the class of work ought to possess, in order to be employed efficiently from a pedagogical standpoint. They are, in M. Salomon's opinion, as follows:—First, it should be the means for acquiring a taste for work. Secondly, to develop a general dexterity. Thirdly, to inspire order and exactitude. Fourthly, to induce habits of order and method. Fifthly, to awaken and maintain the attention of the pupils. Sixthly, to assist in the physical development of the children. Seventhly, to exercise the muscles of the body so as to exclude the evils attendant upon a sedentary position. Eighthly, to assist in a methodical gradation, and Ninthly, to develop the taste for the beautiful.

It will be necessary to pass in review the different sorts of work which have been proposed, and examine the particular qualities which each may possess.

In working at the forge it is impossible for the pupils to keep themselves clean. It therefore acts, to a great extent, against a principle that is one of the most important in education. The work at the anvil is also generally of a more severe character than the physical qualities of the child is capable of sustaining; the heavy hammer also makes the work too hard for the children. The use of the file is a very monotonous exercise. It is difficult to use, and requires a long time before a pupil can obtain any dexterity with it. In many cases there is nothing left  
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for the children to do but blow the bellows. "It is not necessary," says J. J. Rousseau, "to utilise all the professions in order that all may be honoured; it is sufficient that one should not be estimated higher than another, in order that one child may not esteem himself in a position higher than another. When one has the choice and nothing exists to determine the child either one way or another, why not consult his own taste and inclination with reference to which trade he would prefer? Work in metals is very useful, perhaps the most useful of all. There is, however, at least one particular reason why I would not adopt it in the school—I cannot make your son a farrier, a locksmith, or a blacksmith, and I do not want to see him at the forge with the face of a Cyclops."

Basket-making obliges the child to work sitting down, and fatigues beyond measure the back and the chest. The children who commence it complain dreadfully that the stooping causes them intolerable pain and weariness; and twisting the rods at first blisters their fingers in a very grievous manner, which continues until their hands are hardened by exercise. This occupation cannot be recommended as a means of developing taste; nor does it cause the habits of order or exactitude. The work of the pupils never attains to that degree of perfection which is seen in the models, and the small variety in the movements given to the body of the child renders the work machine-like, and gives a result, contrary to the principles we desire to cultivate.

As regards house painting, when we consider the small time which can be given to manual training, a child who would wish to learn this business could not possibly attain any practical knowledge in the most important part of this art, viz., the preparation of the colours. The brush would only serve them in the first place to dirty their hands, face, and clothes, and on account of these objections the parents would not look with favor on this kind of work.

The occupation of book-binding also compels the children to work in a sitting position. It is a comparatively rare occupation. The work executed by a person who is not a regular tradesman is of so mediocre a quality, and corresponds so rarely to the price of the materials employed, that it is easy to see that this work demands greater attention than children are able to give to it.

Fret-saw work also ought to be excluded from the school as not being a suitable subject for instruction. In these exercises the child has to place himself in a position more fatiguing than that which he has to adopt while leaning over his books. The necessary materials are rare and difficult to find, and the objects made are of very little value. While there are so many kinds of manual work by which we may produce useful objects, we should not think of teaching the children of workmen, a class of work which belongs more to the houses of the upper classes than the modest dwellings of the poor.

Tailors' work also necessitates sitting in one place, and is certainly not good for the health of the children. Besides this, the children do not like tailor's work. J. J. Rousseau says, "Young boys never themselves choose the trade of a tailor." This remark of the great philosopher is perfectly true, and conclusively shows what an accurate observer he was.

Shoemaking resembles tailors' work in many points, and is almost as distasteful to children. The boots and shoes made or mended by them are scarcely ever of any solid value.

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The same may be said of the plaiting of straw. It is unquestionably a sedentary occupation, and is not the class of work which the first classes of the primary school should be forced to learn.

There remains only carpentry work, which Rousseau speaks of in the following terms:—"Taking everything into consideration, the work I love best, and which is most to the taste of my pupils, is that of carpentry. It is useful and cleanly; it can be carried out in the house, and is sufficiently hard work to give the body the necessary exercise, while it requires address and industry from the workman. In giving the necessary form to the work it requires also that elegance and taste which should never be excluded." This remark of the philosopher is also well considered and very true. Go into a workshop while the pupils are at work and you will notice at once their vivacity, the constant motion, and their gaiety, showing how delightful they find their work. The management of the saw, the use of the plane, the noise of the hammer, the backward and forward motion of the rasp, produce a picture which animates the heart and rejoices the spirit. See with what precision the little workmen measure off their work; with what serious attention they receive the remarks of the teacher; and with what exactitude they attempt to imitate the minute details of the model. The emulation which exists between these young children is of the utmost use; for that emulation which excites each to work better than the other in a noble rivalry, free from pride and envy, and surrounded by a sweet atmosphere of joy and contentment, cannot but be a great factor in education. They notice the length of time it takes to perform their work, and the degree of success that attends their efforts, without the slightest resulting friction.

Carpentry is therefore that class of occupation which contains in the most complete manner the pedagogic principles which we have proposed. It produces not only the advantages I have before cited, but gives to the young ideas a methodical arrangement, and inculcates a disposition that overcomes difficulties by the easiest method. This eminently educational quality gives it a right of being cited as a subject in primary instruction, which ought to engage the attention of all persons who take to heart the education of infancy in order to give it a place of importance in the usual programme of studies.

Experience has proved that this class of work furnishes results which no other kind of work can possibly produce. In the presence of all these advantages influential persons and the friends of infancy ought to do all that lies in their power, and by every kind of moral and material means to assist in developing this class of work in the school. It must not be lost sight of that carpentry alone gives that general dexterity which ought to be acquired in the primary school; the number of tools required, and the great variety of bodily movements, are far more important than in any other occupation. All these serve to give the necessary exercise with the desired general dexterity which is sought to be acquired.

Turning and wood-carving are closely allied, and are necessary complements to carpentry, therefore they should not be neglected; they ought, however, to be only accorded a place of secondary importance. Wood-carving will certainly assist in an æsthetic sense, which instruction in manual training ought to develop. The work in these two branches of carpentry and cabinet-making ought not to be taught as specialities, but as being mutually connected. We must not abuse one or the other as a means of contravention to the elementary rules of hygiene. The turning-lathe only exercises a certain number of muscles, and wood-carving requires a position which

which is uncomfortable. It is therefore important that these off-shoots of cabinet-making should only serve to complete what carpentry has commenced, or simply to give variety to the work. Carpentry, therefore, combined with turning and wood-carving, possesses the qualities that are desired, and fulfils all the necessary conditions to attain the proposed object in giving instruction in manual training in the primary school.

There are two things to consider in the matter of pupils: first, the age the pupils should have attained before they commence this study; and, secondly, the number of children it is possible to place under one master without inconvenience. As most of the army of technical educators are persuaded that manual training is the most active agent of a good and solid education, it should be taught to all pupils who have attained the scholastic age. Actual circumstances, however, are opposed to this general extension. It is necessary that we should be contented with a portion of the desirable results. The want of success in teaching manual training in some of the Danish schools may be attributed in a great measure to the unbalanced process by which all ages were made to participate in this instruction. According to the opinion of the Nääs authorities the time for this generalisation has not yet arrived. In order that a new idea should have time to take root and spread itself in society, it is necessary that its development should be gradual and its application limited. It is much better to commence in a somewhat restricted manner than to spread at once into too large proportions, with the risk of having to recommence. In the first place, nothing is risked; in the second, everything is lost. The way we should suggest that this instruction should be given in the primary school is that it should be limited, in the first place, to the advanced classes; because these are stronger and more able to manage the tools. They therefore fix the minimum age for the commencement of manual training at from ten to twelve years; but it is evident that this limit should not be applied too strictly. There are, indeed, children of twelve years who are unable to work on account of their constitution, whilst others of eight have acquired considerable and sufficient physical development. The age at which their instruction should commence might well be left to the judgment of the master. From the replies to the circulars we have already spoken about, we learn that in Sweden 135,965 children are placed under 1,563 instructors and instructresses, which makes 87 pupils to each teacher. Of these 87 children we may count 45 boys, of whom 19 are over the age of 12 years; and 42 girls, of whom 18 have attained the same age.

It is important to restrict the manual training to the eldest boys of the school; and it is not less important to limit the number of pupils submitted to the direction of the master. It is the master who has to judge and decide for himself in this case, taking as the base of his calculation his ability for teaching and his experience. If he has not had a large experience the number ought not to be over six at the commencement, and perhaps it would be better to reduce it to four. As the pupils have received no exercises in this work, and consequently ought to be guided step by step, the teaching of any number requires very close superintendence. In writing, for example, there is only one instrument to superintend, whereas in carpentry there may be forty. If the teacher does not perceive that the pupil holds his pen in an improper manner during one writing lesson, he may correct that fault in one of the following lessons. It is not the same, however, with lessons in manual training, where the nature of the tool varies in each instance, and where the  
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improper holding of the tool may cause the pupil to contract bad habits and hinder the regular execution of his work to a considerable extent and vitiate his good taste. The master should commence his class with from four to six pupils. This number may be slowly augmented according to the degree of dexterity shown by the first pupils; this number may be increased to eight and even up to twelve, but in the opinion of the best authority it ought not to exceed this number. Experience has certified to the impossibility to do efficient work with a great number of pupils; and we think it next to impossible for a master to direct fifteen pupils, until several of them have acquired such dexterity that they are not only able to look after their own work, but to assist in the character of pupil-teachers. If, therefore, each teacher has nineteen pupils of twelve years of age, these pupils ought to be classed in the first place into four sections, afterwards into three, and further on into two divisions. It must always be borne in mind that the masters should make a regulation that only those pupils who conduct themselves well, and who perform their duties in the general school work in a satisfactory manner, should be allowed to participate in manual training. This measure, seeing how fond children are of this occupation, cannot fail to produce a favourable influence upon the general discipline, and also in the application of each individual pupil.

The difficulty generally of finding a convenient place to be used as a workshop in the school-building is a great hindrance to the generalisation of manual training. The use of the ordinary class-room for this kind of work is not advised as it would form an obstacle to the maintenance of that propriety and order which are so essential in the school. It is therefore necessary that the workshop should be a special room for the purpose. In building new schools it is easy to arrange that the workshop should be placed in the vicinity without going to any considerable expense. In the school buildings already erected it is not often so easy to appropriate any particular room without disarranging some other class. In towns the garrets are generally the only places to be found in which to work. Sometimes the buildings are of such a class that a lean-to may be attached to them without much expense. In the country this does not apply, and in other circumstances the class-room may be of such dimensions that a portion may be partitioned off. At the beginning it is not necessary that any exaggerated pretensions should exist with reference to the locality; the teaching of manual training being once well organized the administration, the municipality, the parish, and the pupils, will not fail to give sufficient subsidies to the work to carry it on and probably to develop it. The following conditions are requisite to instal a workshop for manual training in a properly organised manner. The workshop should be installed in the same building as the school, or an adjoining one. In the first place the workshop should be placed in such a way that the noise of the pupils at work should not derange the studies of other pupils who may be in the class-room. An outside door should open upon a court in order to facilitate the taking away of shavings and other rubbish. A workshop intended for six or eight benches and a turning-lathe may have a square form. If it is necessary to have eight benches it is better that it should be rectangular, but its length exceeding its breadth, so that the passages between two rows of benches should not have too great a width. The size should be proportioned to the number of pupils who have to work at the same time. The width of the shop should be from 5 to 6 metres (say, from 16 to 20 feet) and we should calculate the surface of the floor in such a fashion that each pupil should occupy about  $2\frac{1}{2}$  metres square, or (say) 80 square feet. For the turning lathe it is necessary to increase the length of the shop

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by about 1 metre. In height the workshops should not be less than 12 feet. It is also necessary to avoid, as much as possible, working with an artificial light. For that purpose the windows should be conveniently placed, and sufficiently numerous and large; they should occupy in a general way a surface equivalent to 80 to 100 feet. Three sides should be lighted if possible. The windows of a workshop require more height than ordinary rooms; they are generally made from 5 to 6 feet high by 3 feet 6 inches to 3 feet 9 inches wide; they are placed as near as possible to the ceiling. The distance between the window and the ceiling ought in any case to be over 12 or 15 inches, and the distance from the floor to the window 3 feet 3 inches to 3 feet 6 inches. The benches being of about the same height, it is necessary to take precaution, otherwise the windows will be more liable to be broken by the tools and materials coming against them.

In order to prevent the ceiling and walls from injury by being knocked about, it is necessary that they should be boarded. This plan favours neatness, and the ceiling might also be made of varnished wood.

Heating the workshop is done in winter by means of iron or terra-cotta stoves with bent tubes. These give out sufficient heat, and enable the pupils to make their own glue. It is not necessary otherwise that the temperature of the workshop should be as high as that of the class-room, as the pupils who work with their hands conserve the heat much better than those who remain inactive at their desks. A temperature of 60 degrees Fahrenheit is quite sufficient for the workshop in winter. If the room is not used exclusively for manual training it is necessary that cupboards for the tools should be fitted to it, and these can be arranged along the walls. In cases where the work takes place in the evening, where there is no gas, the lighting will be by means of hanging lamps, suspended in such a way that they cannot easily be displaced or broken. It should be observed in this place that three rooms should be attached to the workshop, one of which is for the storage of the models, the second for the finished objects, and the third for the boards and other materials that are used in the workshop.

M. Salomon believes that each class of manual training should last two hours, in order that the pupils may have an half-hour to prepare, sharpen, and replace the tools in their proper places. It would be even better, perhaps, if the classes could be attended for three hours with fifteen minutes interval for recreation. Each child should obtain this manual instruction once a week. We will suppose that the pupils are divided, as already said, in two or three sections. Thus four or six hours per week will be passed in the workshop by the master. It is not very much, and it would certainly be useful to devote two, or perhaps four, hours more to this study than stated, but it is far better to have a little than nothing.

It is also understood that practical instruction should be placed among the other lessons of the programme rather than to devote, in preference, a portion of the evening to it. It is not needful that a special day should be employed for the workshop exercises, but on the contrary these physical exercises should alternate with the intellectual studies, so that the children should have the same esteem and consideration for manual training as for other matters of study.

It would not be wise to prolong the duration of the classes to give the new instruction. In order to attract pupils to the school, manual training should take place in the time that is subtracted from theoretical exercises. In particular circumstances, as for instance, where in several districts of Sweden the children cannot

cannot attend the school every day, the workshop studies can be made in supplementary classes, in order that they should not take up any portion of the time that is indispensable to other studies.

The materials of instruction comprise tools, models, and sawn timber. It is useless to give to each pupil a complete kit of the tools that are employed. Measures such as that would bring about an enormous increase of expenditure and create many difficulties in the propagation of manual training.

The following table will serve as a guide for the necessary tools for the workshop of a primary school, these having been found sufficient in Sweden:—

Name of the tool.	Number of tools required for six pupils.	Number of tools required for twelve pupils.
Bench ... ..	3	8
Ripping saw ... ..	2	4
Hand saw ... ..	1	4
Panel saw ... ..	1	1
Turning saw ... ..	2	3
Do large size ... ..	1	2
Fret saw ... ..	1	1
Jack plane ... ..	3	8
Trying plane ... ..	3	8
Smoothing plane ... ..	3	8
Toothing plane, with two irons ... ..	1	1
American iron plane, smoothing ... ..	4	4
Chisels (set of firmer chisels) ... ..	1	2
Mortise chisels (set of eight) ... ..	1	1
Set of gouges ... ..	1	1
Carving chisels and gouges, assorted ... ..	1	1
Pincers for iron wire ... ..	1	1
Flat pincers ... ..	1	1
Small pliers ... ..	1	1
Large pliers ... ..	1	2
Flat rasp ... ..	2	4
Half-round rasp ... ..	3	6
Round rasp, rat tail ... ..	2	4
Triangular rasp ... ..	2	4
Brace, with twenty-four bits ... ..	1	1
Small auger ... ..	1	2
Draw-knife ... ..	4	6
Spokeshave ... ..	2	3
Hammer ... ..	4	8
Mallet ... ..	4	6
Compasses ... ..	2	2
Callipers ... ..	2	2
Polisher ... ..	4	6
Screw-driver ... ..	3	6
Square ... ..	4	8
Glue-pot ... ..	1	1
Oil-stone ... ..	2	3
Grindstone, 18-in. ... ..	1	1
Broad hatchet ... ..	1	1
2-foot rule ... ..	2	4
Bevil ... ..	1	2
Marking gauge ... ..	4	8



Of course this list may be modified, and for small schools much simplified, but it can be seen that the cost of providing tools would not amount to any very large sum.

The Boston Commission says, "The Nääs system can be summed up in the following manner:—(1) To explain to the children the natures of the materials, the names and usages of the tools, the geometrical forms which relates to them, and to initiate them into the principles of work; (2) to apply these principles in making simple objects, which at the same time may be instructive and useful, the difficulties of progression must be rigorously graduated, geometrical solids, boxes nailed together, and the simple implements and articles constructed, and which may be taken away by the children after the approbation of the master; (3) to accustom the children to make these objects themselves without the assistance of the instructor, who should only indicate how the work should be done." It seems to me this class of instruction is highly successful, and that all countries must of necessity participate in its benefits. The movement in its favour seems to be general, and will doubtless engender ideas that will soon determine the most convenient way to achieve perfect success. I firmly believe it will prove a most powerful means of education, in addition to teaching that knowledge of hand-work, which is admitted by all to be so thoroughly necessary and useful. It is devoutly to be wished that the schools to which are confided the care of bringing up the children of the people should be something more than institutions where the only thought is how to form the faculties of intelligence; but it is not desired in any case that manual instruction should take the place or usurp the rights of other matters which have to be taught. What we desire is the simultaneous development of body and mind, of the head and the hand, and of the heart and the eye. It is in this intimate association to which we should direct our efforts, the school of hand-work and the primary school.

M. Desmoulins, who belongs to the Municipal Council and to the General Council of the Seine, who is also Secretary of the Instruction Budget, and perhaps has had more to do with experimental technical education than any other man in France, stated at the Bordeaux Congress that in the City of Paris not less than 25,000,000 of francs is expended annually on education. This budget comprises the entire cost of public instruction in Paris, but in the greater part of the scholastic services technical instruction, both industrial and commercial, was considered of the greatest importance; in fact that it was absolutely the great question that had to be dealt with. Primary instruction in Paris is given in the following institutions:—126 maternal schools, 17 infantile schools, 174 primary boys' schools, and 175 primary girls' schools. This makes a total of 492 establishments in which elementary instruction is given to 145,000 pupils. The staff employed in all the branches consists of over 3,000 teachers, of whom about 1,500 are males and 1,500 are females. The salaries of the teachers are not less than 9,000,000 and a half francs (£380,000). The maternal schools have taken the place of those institutions that were formerly called *salles d'asile*, which in reality were nothing more than places where children were taken care of while their mothers were out at work. The greater part of the maternal schools of the present day are provided with Kindergarten apparatus, and the instruction is carried out on Froebel's system, which is in reality the true commencement of a technical education. Drawing and singing are both taught in connection with the usual exercises of the Kindergarten. One of the drawing inspectors, M. Ottin, the eminent sculptor, has

has already introduced into the greater part of these schools a class of exercises which may properly be termed a system of gymnastics for the eye, the mind, and the hand. These familiarize the children little by little with the elements of drawing, and this leads them later on to arrive at what we may term the "writing of form."

In Paris, at the last exhibition of decorative art, books were exhibited full of the drawings of these little folks of from 6 to 8 years of age—very remarkable for their ingeniousness, their hand power, and originality. It is to be hoped that manufacturers will largely interest themselves in these schools, for who can doubt that children so brought up will not distinguish themselves as they grow up in designing patterns for textile and other fabrics, embroideries, &c.

It has been the subject of much discussion whether it would be beneficial or otherwise to introduce elementary workshops into primary schools, and it was at the Bordeaux Congress unanimously and definitely decided that the utility of these institutions has been fully recognized, and that their introduction should not be delayed. For girls, schools the matter is a much simpler one. By the French law of 1882 manual training was introduced into French elementary boys' schools at the same time that dressmaking and cutting-out classes were introduced into the girls' schools. The result has been that the 175 schools have become little workshops of dressmaking during the proper hours for those particular classes, and excellent work turned out.

Now to speak of the infantile schools. In Paris already seventeen of these institutions have been established, and, as I said before, they have replaced those that were formally called asylums (*salles d'asile*). The children are here taught the elements of knowledge that will prove useful further on. M. Desmoulins says:—"There is nothing more charming than to see these little ones devote themselves to their exercises, which are so designed that they partake of the character of games or pastimes, and the children amuse themselves while being instructed." Their exercises are directed in such a way that the information they gain and the object of their lessons will be useful to them later on in life. This is therefore the commencement of an excellent education. The children are encouraged to ask their instructors questions, to which they at once obtain the answers. They are enchanted with their work, and are much happier at school than they could be at home. When they leave these maternal schools in order to enter the primary schools they have to be somewhat restrained. The discipline has to be more severe, and they have to submit to silence and an immobility which has nothing in common with the license they have enjoyed in the maternal schools. The municipal council have therefore in contemplation to bridge the gap which exists between the maternal schools and the primary schools, and towards this end have created the infantile school. These schools, which are specially for boys of from 6 to 9 years of age, are taught by women, and are found to supply the want so much felt in preparing the pupil for the primary schools. The system and the processes made use of in the maternal schools are continued in a modified manner in the infantile schools. The minds of the children at this age commence to develop and expand—their memory has become more exact, and their judgment more accurate. The experiment has been completely successful, and it has been found that women are much more capable of conducting these schools than men. The seventeen infantile schools already installed have rendered such good service,  
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and the female teachers have been so successful, that it is now a question with the council whether all the elementary classes of the primary schools of Paris should not be taught by women.

Teaching by the attraction of games and direct observation prepares children for a new method of learning, which will leave a much greater latitude than has hitherto been considered desirable to the pupil's perceptive and imitative faculties. It must not be forgotten that at present the system is actually only a sort of patchwork education, and the great object with all is to bring about some general method of instruction for all classes of schools. Thus the mistakes which have been discovered in the experimental state of existence will disappear, and at present it is most reassuring to know that the municipality of Paris has established in all the primary schools a commencement of technical instruction.

Allusion will now be made to what has been done in Paris in the schools of a somewhat higher class. In the first place, the Rollin College must be considered the municipal school, in which is taught all the subjects which are laid down in the university curriculum. It may truly be said that this is a State college, and the only part the city of Paris has in its management is to provide the funds necessary to carry it on. The direction is placed under the university authorities. The Chaptal College is of a more municipal character. A great number of youths are trained for commerce in this institution. Some of the pupils on leaving go to the Polytechnic. Several have been received there this year, and from forty-five to forty-six of the pupils have received the bachelor's degree of science or physics in the University of Paris this year. These two colleges instruct about 2,400 young men. The schools which are more particularly primary superior schools, such as the schools of Turgot, Colbert, Lavoisier, J. B. Say, and Arago, are of an excellent character, and to these the best pupils from the primary schools are admitted gratuitously. In many particulars these may be termed professional schools. Thus a thorough commercial education for merchants and their employés is furnished at the School Turgot, where there are 810 pupils, at the Colbert 714, at the Lavoisier 480, at the J. B. Say 683, and at Arago 476, making a total of 3,163 boys, who are being instructed in the best possible way to enable them to obtain a living by trade. Paris also possesses a primary superior school for girls, in which there are 280 pupils. All these boys' schools, excepting the Rollin, have workshops for manual training, and the preparation has been made exceedingly useful, as the greater portion of the pupils embrace those industrial arts which are the greatest source of Parisian wealth. Besides, it is of the greatest importance, in a moral point of view, to teach these young people how to work, and to direct their studies towards those trades which have hitherto been thought to be of a somewhat derogatory character. "We hope," says M. Desmoulins, "to destroy, from their very beginnings, those causes of dislike to manual labour which have been evinced by the Parisian youth, and show them how honorable it is. Paris has always been in the first rank in everything which contributes by laborious activity to elevate a nation by work, and it is high time that manual training should occupy the high position to which it is destined."

I now come to the adult classes, of which so much has been spoken and written. The municipality of Paris has instituted both adult and commercial classes. In the first the number of scholars is falling off considerably, and  
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gradually becoming less and less, while, on the contrary, the commercial classes have rendered services which the public appreciate in a more marked degree every day. It must be specially noticed that the classes established by various societies, such as the Polytechnic, the Philotechnic, and others, are followed with great ardour by the Parisian youth. The municipal council have, therefore, been able to diminish each year the sum devoted to the adult classes, and been thereby enabled to augment the subsidies accorded to the commercial classes and the free societies for the advancement of education.

The teaching of drawing in the city of Paris costs about a million of francs annually, and it is thought that this instruction does not produce the desirable results that could be reasonably expected from the expenditure of so large a sum. The professors are men of talent, and, for the most part, animated by a truly laudable zeal; but they complain, and with considerable reason, of the faulty method which prevails in not making it compulsory for the pupils to attend the elementary classes in the commencement of the course. They give their instruction in the superior primary schools, but a large number of the pupils have not received the requisite elementary instruction, and this applies also to the middle classes, for which a very incomplete and not altogether well-directed preparation has been made. From this cause a notable loss of time and effort must necessarily take place. It ought, however, to be stated that, by perseverance, the professors have obtained, in spite of these obstacles, some remarkable results. The Workmen's Exhibition, and the Exhibition of Art applied to Industry of 1886, have enabled the public to take cognizance of this progress. These exhibitions have shown the actual work that has been done, both in the day and evening classes of the schools. The progress of the school in the rue Ste.-Elizabeth, and also that of the pupils of the municipal school, in the rue des Petits-Hotels, where the application of fine arts to industry is carried on, is especially remarkable. At these schools work is carried on in four workshops—(1) modelling in clay; (2) sculpture in stone, wood-carving, &c; (3) designing for textile fabrics; and (4) decorative painting, &c.

The pupils can, therefore, employ themselves in the workshops all day, and follow in the evening the classes upon the history of art and other subjects. They are taught the elements of the various arts as applied to industry. For example: They are taught what a Grecian vase is like, and what it developed into at the Renaissance. The professor draws the form of the object upon the blackboard, while the pupils, following him, copy his work into their note-books, making their own remarks of the explanation given to them. These young people can then be instructed to design a wash-basin, inkstand, or any other industrial object, and they will at once indicate the epoch and the school in the character they give to their design, which is left to their own imaginations. I have seen compositions made in this manner where the design has been recommended by its general correctness, and also where the pupil has completed the working drawings and sections ready to be put into the workman's hands for execution.

With results such as these the municipality of Paris are well content, for they have been able to provide for the youth of the working classes schools wherein during the day they can practise real work, and during the evening study the history of art or theoretical science. This is emphatically the case with the school for the application of the fine arts to industry in the rue des Petits-Hotels, where actual work is carried on from the morning until the evening, under the constant inspection of a talented professor. The municipality has also shown  
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how much it has at heart the great interests of art and commerce, in the excellent arrangements they have made to develop the highest class of artisan. With reference to the apprenticeship schools, at the head of which we place the school of chemistry and physics, which contains ninety students, who receive a monthly subsidy of 50 francs, the city of Paris is amply repaid for the sacrifices it makes with reference to these young men, as the services of the specialists trained in this school have already been distinctly recognized by the masters as giving a higher tone to their employés.

After this comes the Diderot municipal school, on the boulevard of la Villette, and which is in every sense a school of apprentices. The regular cost of the Diderot school extends over three years. Out of 100 pupils at present, there are sixty-four of the third year, who will complete their apprenticeship at the end of this year—1886. This is a highly satisfactory result. When the municipal council of Paris, the founders of this school, determined to raise the standard of apprenticeship, which had not only fallen into disuse, but, where carried out, it was found the trade itself was not thoroughly taught, it never intended to satisfy all the exigencies of the city in the teaching of handicrafts, but to set a good example, and to make the experiment of apprentice schools. They are now satisfied that it is possible not only to give thorough technical instruction, but even to practise the work in the school. The school in the rue de Tournefort is of a somewhat different character, for there the workshop is really in the school. This combination has been very much spoken against in the past, but it is known to-day that the good results which this school has shown have been universally acknowledged. The Diderot school has also done good service. The young men who leave it can earn from 4 francs to 5 francs a day in Paris, and it must be felt how valuable and precious such examples must be when exhibited in the centre of industries such as those that belong to France. What has been done is only considered to be an experiment, but the work has been faithfully performed, whatever may be said by detractors, and I can bear witness that the results have been excellent in the way of teaching a trade.

The Diderot school is not the first experiment. It was founded in 1873, while the town of Havre had a school of the same class as early as 1866. This is not nearly of so high a character as the Diderot school, but has proved eminently useful, as the pupils, on leaving, generally earn about 2 francs a day. They readily obtain employment, as improvers in the manufactories, at the above rate of wages, and many, I know, earn from 4 and 5 francs to 7 francs a day—3s. 4d. to 5s. 10d. The average wage is, however, about 2 francs for boys of 15 years or thereabouts. There are also at the Havre institution cookery classes and marketing classes for girls, where they are taught everything pertaining to domestic economy. On leaving school many of the girls go into drapers' and milliners' shops, where they earn from a shilling to eighteenpence a day, besides a portion of their board. In Havre the boys employed in the various school workshops are 273, and the total cost is 42,150 francs, and the apprenticeship school for girls have 210 pupils, incurring an expense of 26,270 francs.

There is another fact which is not generally known, but which acted as the great incentive to municipal authorities in the establishment of apprenticeship schools. The jury of the Universal Exhibition of 1867 reported that the quality of the products of French industry had deteriorated and fallen off generally, and  
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on an inquiry being instituted, this could only be attributed to faulty apprenticeship, and it was easily seen that the workman scarcely ever deserved the title of artizan that was once so famous in Paris.

The Municipal Commission of Paris sought a remedy for this deterioration, and, upon its suggestion, the council voted a sum of 20,000 francs to be distributed annually to young men who had received their indentures of apprenticeship. The prize offered to each was 250 francs (£5). Very few laid claim to these prizes, for the first year (1868) there were only  $2\frac{1}{2}$  per cent. of the young men who called themselves apprentices that claimed a prize. The same proportion only obtained prizes in 1869 and in 1870. Thus the Municipal Council had in their hands a fund already voted nearly equal to 60,000 francs, they determined to experiment, and, with this sum, they founded the school of the Boulevard de la Villette. During these three years only  $2\frac{1}{2}$  per cent. of the young craftsmen of Paris properly fulfilled the conditions of their apprenticeship. The cause of this is that families cannot sacrifice so much of the time of their children without compensation, hence they find it necessary to send them to factories and mechanical workshops, where they can be employed at specialities. Thus they only become initiated in one or more of the general processes of their trade which may probably be simply to attend upon a machine.

The Diderot school was established to counteract this downward tendency and has now 330 students who are taught eight different trades—six in iron and two in woodwork. The principal difficulty has been to retain the pupils in the workshop until the accomplishment of their third year. The first year is consecrated to a kind of general class-work in wood and iron. During the first eleven months the pupil passes successively through the eight workshops of the school. This practice has been found to give the very best results, imparting as it does a general practical knowledge to the student and enables him to decide upon the class of work he likes best. In the second year, when he has chosen a trade, he has become sufficiently dexterous to do valuable work. So much so that small masters in the vicinity of the school entice the pupils away by offering them wages. It thus follows that only a small number of pupils follow the entire course of the school to the conclusion of the third year. Four years ago the school had 270 pupils, out of which twenty-five only were of the third year. The Council of Inspection endeavoured to get over this difficulty by instituting luncheon prizes for about a third of the pupils of the school. Also in the organisation of a canteen; in giving prizes to the most meritorious students of the third year; and by organising educational holiday trips to visit some industrial towns or manufacturing districts. For this purpose a class was arranged and placed under the care and supervision of a competent instructor. By inducements such as these the difficulty, to a considerable extent, has been surmounted, and this year seventy-five pupils of the third year have completed their apprenticeship and passed into the ranks of the various Parisian industries. The diplomas given to the pupils of the third year are of equal value to an indenture of apprenticeship, and is quite as highly considered and well appreciated by the manufacturers.

A second school of apprenticeship has been just opened in Paris for teaching the manufacture of furniture, and is situated Rue de Reuilly. Further the town of Paris has also opened a school for orphans in the Avenue Philippe-Auguste, in which about 100 boys are learning different trades in wood and metals. If, therefore, we make a total of the number of pupils in Paris who are learning different trades, we find:—In the school of physics and chemistry, 90 pupils; at the Diderot school of apprenticeship,

apprenticeship, 330 pupils; in the furniture school, 60 pupils; and at the orphan school, 100 pupils; making a total of 580. There are therefore 580 young apprentices taught by the municipal schools.

The girls have not been forgotten either. The city of Paris has founded five apprenticeship schools, called professional and housekeeping schools for young women. The school in the Rue Fondary has 180 pupils; Rue Bouret, 123; Rue Bossuet, 200; Rue Ganneron, 130; and Rue de Poitou, 170. If we add to these figures the number of pupils in superior primary schools where professional classes have been established, it will be seen that 1,083 young girls receive lessons in book-keeping, dressmaking, painting, on porcelain and fans, the manufacture of artificial flowers, &c. The tuition in domestic economy and housekeeping is both theoretical and practical, and every effort is made towards giving young women the means of gaining honest livelihoods. The first that presents itself is employment at the desk, and for this the great object is to arrive at perfection as far as possible, in the book-keeping and commercial classes. These classes are so thoroughly considered and carefully taught, that the practical application of the English language both in speaking and writing is one of the subjects of daily instruction. Drawing is also taught, with painting on porcelain and on fans, the fabrication of artificial flowers, and the application of designing and painting in a manner to be actually and commercially valuable. In dressmaking, all the schools which have sent their products to national or international exhibitions have obtained prizes, this gives a good idea of what has been really accomplished. Thanks to modern progress, the good will of everyone converges towards energetic endeavours, to achieve good results in the elevation of the morals of the country, and in the development of that which appears to me to be one of the first and greatest virtues, namely, the love of work. It is indeed a pleasure to see such great commercial and powerful municipalities as Paris, Havre, Lyon, and Bordeaux, encourage everything which is of a nature to honour labour, and place it in a better and higher position. "This," says M. Marsoulan, "tends to render to national education the character which, the Encyclopædia tells us, the French Revolutionists would have carried out—equal and thorough instruction to every child in the country. Let us hope that the movement will not be hindered, and that we shall be able to educate our youth in a way that will contribute more and more to the greatness and wealth of France."

In Switzerland each canton has special institutions and a different legislation regarding technical education. The State possesses a Polytechnic Federal School which is situated at Zurich, and is subsidised by the confederation. Engineers of roads and bridges, mechanical engineers, chemists, architects, and professors of technical education; in short, the principal staff of the arts and manufactures receive special instruction in the different sections of this industrial University.

Among the schools that are subsidised by the different cantons may be mentioned those of the engineering school of Lausanne, and that of arts and trades at Winterthur. Schools for teaching watch and clock making in Jura, those of spinning and weaving at Basle and Zurich, and also the schools of the industrial arts at Geneva and other towns, and the school of wood-carving at Brionz.

The attendance at these schools during two or three years necessitates considerable sacrifices in time and money from families who, with great difficulty can afford to make them. In these families it is necessary that the apprentice should, as soon as possible, gain his own living, and in the factories where extreme division of labour

labour prevails this result is obtained sooner than where a speciality has to be learned. From this cause good workmen are becoming rare and it has been found absolutely necessary to effect some reform in apprenticeship or in obtaining that instruction necessary to the learning trades. This great problem is as difficult to solve in Switzerland as elsewhere, and the question is whether it is possible to give the necessary theoretical instruction in the workshop, or must it be done outside?

M. Etienne, the Bordeaux delegate from the Swiss Confederation, says in effect the situation of a workman on account of the general employment of machines is much changed of late, as often his work only consists in attending a machine which has simply to be oiled and watched. His intelligence has no room for play, nor does the work even physically affect him. This is what causes the degeneracy complained of, for it affects the faculties of the workmen both intellectually and morally. He simply becomes a portion of the machine he works. The duration of the hours of work in Switzerland have been reduced from 12 to 11 hours per day, and this hour may certainly be profitably utilised by both the workmen and apprentices to develop their intellectual and artistic faculties, and classes for this purpose have been very much extended. It is thought in Switzerland these classes ought not to be altogether gratuitous, but that a portion of the disbursements of the pupils should be given as prizes to the most painstaking pupils at the end of the year. The Swiss Confederation has come forward during the last two years and offered subsidies to apprenticeship schools, and also to classes for professional instruction. These subsidies are a means by which the central power may exercise official intervention, for in Switzerland the Cantons themselves are exceedingly jealous of their independent liberty of action. They will never give up their rights except in the presence of the greater interest of the Confederation.

An order of the Confederation of June, 1884, details the mode of the division of the 150,000 francs—£8,000—which had been voted by the Federal Assembly in favour of the development of artistic and professional instruction. Since that time the official inspectors have visited the schools and professional classes, in which the teaching of drawing forms the most important part of the instruction, and they superintend the expenditure of these subsidies, and report upon the organisation and development of instruction in each institution. These reports are calculated to induce a very keen rivalry among the schools. The Federal subventions are made in direct proportion to half the money voted by the local authorities. Notes of all furniture and expenses are minutely verified, and the services carried out by the inspectors are well done, and the plan works with the greatest regularity.

The courses of instruction are organised on a plan similar to that of the Society Philomathique of Bordeaux. The Professional Academy of Geneva has already more than twelve different courses, among which the classes for girls are conducted in a manner similar to those in Paris, and to the Society for Professional Instruction. At Locle, a manufacturing town of over 12,000 people, they have adopted a plan similar to that of the Society of the Rhone for Professional Teaching. These two institutions have been founded during the last three years, and seem to give the same results as those of the Lyons professional schools. The division of Switzerland from France is only an imaginary line as regards instruction, and is in reality no barrier either against the French or the Swiss, between whom the most cordial relations are sustained. Mr. Lang is the director of the Society for Professional Teaching, of the Rhone and La Martiniere. This school is directed and carried on in the most perfect



manner, and is remarkable for the application and assiduity of its pupils, and these circumstances are to be remarked in all the classes. On inspecting the working of this school the impression given is that all this is brought about by the happy conceptions and management of the gentleman who presides over and organised the institution. The principal features are that the society receives a subsidy from the State, and another from the Department of the Chamber of Commerce of Lyons, who founded the institution. These subsidies cover a third of the whole expenses of the school, and a third part is furnished by donations from the people, while the remaining third is furnished by the pupils themselves, who pay from 3 to 6 francs per trimestre in the superior classes. There are 8,000 inscribed pupils and 5,000 in attendance at the end of last term.

There is a class of pupils called by their comrades *commissaires* (a kind of prefects), who are empowered to maintain discipline. It is their duty to observe and to record by means of class registers, that each pupil is present at the opening of the lesson. They act as a medium between the professors and the pupils, and between the pupils and the administrative council. They have also a voice in the general assembly, where they can state the necessity and ask for the opening of new classes, and investigate cases of the absence of pupils and their cause; they assist and encourage the pupils in their work, and this staff, taken from the ranks of the pupils themselves, renders invaluable services to the work of instruction. These prefects have always done honor to their positions, and their President is chosen by vote from among themselves. There is one of these under-officers or prefects for every six pupils, and their number is never to exceed four for one class, whatever number the class may consist of. The institution of these prefects is considered one of the most solid foundations of the Society for Professional Teaching.

At the end of each year a certificate of assiduity is delivered to each of the pupils who, for no pretext whatever, have ever lost a single lesson in the class. These are granted for each year, and already from twelve to thirteen hundred have been issued. These certificates are very much sought after, and the most strenuous efforts and sacrifices are made to obtain them, because they are considered an introduction of the highest order by the masters, merchants, the officers, and general administrations of the country, furnishing the strongest proofs that the holders are industrious, assiduous, and worthy young men.

The substance of the subjects to be taught in their classes is laid down for the professors, but the means and methods of carrying these into operation are entirely left to the professors themselves. If the courses are well followed the professor gains in reputation in direct proportion, and when, on the contrary, the pupils do not take any interest in the courses, it is considered they have been neglected or not well directed, and the professor is accordingly changed. Thus the professors are kept in direct sympathy with, and are understood and beloved by their pupils. They are looked up to as quite the *élite* of the society.

These are the essential elements of the educational organisation which has been carried out with the most benevolent sentiments of respect and warm sympathies by all who have participated in the efforts which have been so well ordered and successful. In fact, the part taken by the confederation completely dominates and gives a tone to the whole of the cantonal combinations, and vastly increases the value of the results. The desire has generally been to introduce into the whole of Switzerland this same *régime*, and to create institutions of the same class in all the cantons,

cantons, which are quite independent of each other. It is very doubtful whether this can entirely be carried out, from the jealousy that exists between the different localities. Nevertheless, the principles have been transplanted from Geneva and Locle into many places, and have given the same good results, considering the relative proportions of the institutions.

The question of introducing manual labour into the primary school has occupied some time. To be exact, it was in Switzerland the first idea was conceived in the mind of Pestalozzi some time during the first years of the century. In Germany the direction of this instruction is confided to the ordinary teachers, and the Swiss followed in the same way. Their first essay was commenced at Bale, and this year another school has been opened at Berne. The exhibition of the work done is interesting; but there are different opinions as to the opportunities of giving teachers the necessary training to enable them to take charge of this instruction. Their aptitude for the mechanical requirements may be faulty, and in the contrary cases it is felt that some teachers may become so enamoured of handwork as to be absorbed by their preference for it to the detriment of what we may properly call primary instruction. But the utility of manual training has never been questioned, much less denied, by any one. As for Apprenticeship Schools, a movement is gradually making way that will transform the workshop into the school, and make it an establishment of production. The science and art classes are given either before or after manual work in the workshop during the morning or evening, according to the season.

Commercial instruction in Switzerland is still in a rudimentary state, with few exceptions. It is after the practical work in commercial establishments has been commenced that this instruction develops itself. The young men engaged in trade have formed among themselves an institution called the Society of Young Commercial, having branches in many towns, and really forming a federation. They organize regular courses of foreign languages and book-keeping, and everything required in a merchant's office is duly taught. There are several private institutions also which give commercial instruction, but there is not in Switzerland any school on the same footing as those of Paris, Havre, Marseilles, or Lyons. For the last three years there has been a School of Commerce founded at Neuchatel, under the direction of a certificated pupil of the Lyons School of Commerce. The commencement of this school was very modest, as the pupils belonged entirely to the working classes from the primary superior schools, where they followed the ordinary lessons in addition to the courses for foreign languages. The programme comprised one year of study in the commercial section, and this section was subsidised by the Municipality of Paris. The programme, however, comprehends two years of study, and the school has now fifty pupils. The creation of other commercial schools has been contemplated for several years, but they have not yet been founded. The reason is to have experiments made before any extensive schools are decided on. There are many difficulties to be surmounted. The intention is to follow the French system, as what has been borrowed from the French has perfectly succeeded. Two years since delegates from the Cantonal Governments were commissioned to study the organisation of foreign professional and commercial instruction. These gentlemen visited France and Germany to study the subject, and were satisfied with what they had seen carried out in the model institutions of Lyons and Paris, whereupon the State Councillors decided it would be useless to continue seeking information in other quarters. The French system  
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has been generally adopted with every success under the circumstances, because it was thought impossible to find out better methods without too great a loss of time in making experiments that would probably last for years.

M. Eugene Rombaut, the delegate of the Belgian Government, speaking of the present position of technical instruction in Brussels, said that some misunderstanding existed in different countries in the terms used, and wished first to define that which was meant in Belgium by industrial and professional education. These distinctions he considered absolutely necessary, for it must be known that the difference of these terms is being constantly misunderstood, and gives rise to discussions which can only be avoided by fixing the significance of the terms *industrial* and *professional*, which we couple with the word instruction. Each one has reasons for his own special interpretation, and each one follows his own ideas without understanding what those terms may mean in other countries, or whether the terms so employed signify the class of instruction which we understand is being spoken of. Industrial instruction and professional instruction in Belgium do not mean either the manual instruction, or the teaching that is given in many primary schools, or the instruction of adults, or the instruction of the schools of design, academies of art, or the higher studies at the universities. We must content ourselves to speak of them as that class of instruction which is given to workmen or the young women of the middle classes, and to those who earn their living by their own hands. In Belgium, we understand by *industrial* instruction elementary scientific instruction, and by *professional* instruction, elementary scientific instruction combined with apprenticeship. In this last case there is manual training, as a matter of course, but in the former case manual training is not a part of the programme. Industrial and professional instruction comprise—first, workshops of apprenticeship, of which there are in Belgium 45; secondly, professional schools, of which there are 4; and thirdly, industrial schools, to the number of 31. There are besides these a certain number of special institutions, such as the Provincial School of Mines at Mons, the Superior Institute of Commerce at Antwerp, a course of manual training in the working of steam-engines at Namur, &c., &c. Besides these there are the schools of the various departments of agriculture, industry, and public works.

Instruction in the workshops of apprenticeship schools is given to the labouring young men of the country districts who generally work in the fields during the summer months, and in the winter, when there is less to do in the fields, they assist their father or other relations in spinning and weaving. These so-called chamber weavers generally possess two trades, and work either for the merchants or the manufacturers, in which case they receive the *chain* from their employers, or they weave for themselves, personally providing all materials.

These workshops are established all over Flanders, which is essentially an agricultural country, but where the chief towns of the provinces are industrial centres for the spinning and weaving of cotton and flax. The creation of these workshops goes back to 1817, and were duly submitted to Government inspection in 1849. At this time an intense and persistent crisis fell upon the Flemish population who lived by the manufacture of these linen fabrics. The class of working was entirely transformed and hand-spinning and weaving fell before the powerful presence of the steam engine. The Government had recourse to different means to improve this unfortunate position, but all were in vain, it was impossible to combat the machinery that had been brought into the country from England, and employed directly in the linen manufacture. The inferiority of production by hand was made manifest, and consequently hand work was almost abolished. It

It was the apprenticeship schools that again restored this industry in Flanders; they had for their object the improvement of flax-spinning and the weaving it into different fabrics, thus replacing one part of the work by another branch of manufacture; the dying of various tissues, such as the articles now called Roubaix or Tarare goods, together with carpets, flannels, &c.

In these workshops, which are exceedingly simple, the instruction is entirely practical. Boys are admitted after they have attained the age of 12 years. Every day they receive from the public teacher one hour of oral instruction, comprising the study of the Flemish language and arithmetic. The foreman who directs the workshop ought to be able to teach the theory of weaving besides the usual practical instruction. The course of instruction generally lasts three years, but when there is room in the workshop pupils are recommended to continue their work for a longer period. The number of workshops has lately somewhat diminished, but the industry is developing, and demands more men. The workmen when they thoroughly understand their work can move in a larger sphere, as their choice is not limited to the same industry. Everyone will be able to appreciate the benevolent action of these institutions by the great number of workmen they have turned out and placed in the different trades and manufactures. During the whole time manual work in the workshops has been remunerated the daily pay given to the apprentices has varied from 8d. to 10d. These workshops are subsidized by the Municipality, the Province, and the State. The general expenditure of the forty-five workshops amounted in 1884 to 69,754 francs, about £2,790, or an average of £1,550 francs, or £62, per workshop, and 76 francs, or £3 0s. 10d. for each apprentice. Of these sums the State provided 36,350 francs; the Province, 10,335 francs; the Municipality, 18,378 francs; and various other sources, 4,690 francs; making the total of 69,754 francs. The general Government, therefore, provides 52 per cent.; the Province, 13 per cent.; and Municipalities, 35 per cent. of the expenses.

The professional schools for boys, properly so called, are not numerous in Belgium. The attempts that have been made to establish them have not been very favourable, and the opinion is pretty general on the point that it is better to instruct the workman at the school, and teach him his business or trade in the workshop.

The trade schools of France are often quoted in reply to those who are against the establishment of apprenticeship schools; but the fact is lost sight of that in our schools we only address those who intend to become workmen, while in France they look farther ahead. There the instruction is more extended and of a much higher quality, and it is only necessary to compare the curricula of the schools to be convinced of this. The young people who frequent these institutions, which are largely subsidized by the Government, aspire to the positions of directors or managers of works, and the instruction is very costly both to the Government and the pupils. The intention is not to establish a parallel between the schools of Belgium and those of France, but simply to remark the fact which seems conclusively to point out the existing difference between these institutions. There is one school, however, which merits the attention of all, and which in Belgium has given the very best results. This is the one that is instituted at Tournay. A large manufacturer there possesses extensive works, and to these workshops the municipality has annexed an industrial school, which the state subsidizes. The province also renders assistance on the same conditions as to the other industrial schools. The young people who work at this establishment

establishment live the same life as the workmen, and, in fact, are veritable apprentices, under the direction of special foremen. This school was established in 1860, and comprises two sections, viz., the industrial schools properly so called, and that of the workshop school.

In the Industrial Schools they teach French, arithmetic, geometry, physics, chemistry, industrial economy, and drawing. The duration of the course extends over three years, besides a year of preparation. The workshops in operation are mechanical engineering, turning, modelling, foundry work, iron work, and boat-building. In order to be admitted, a boy must be at least 12 years of age, he must know how to read and write, and also be proficient in the four fundamental rules of arithmetic. The theoretical and drawing courses are given during the winter months from 7 to 9 in the evening, and from 6.30 to 8.30 in the morning during summer. The work in the factories is eight and a half hours per day. Each workshop is directed by a foreman, and the supervision is exercised by one of the directors of the school. Special contracts ruling the conditions for work, and the salaries of apprentices are duly recognized. The workshops have the best class of tools, and it may be stated that practical instruction is as well organized as the theoretical at the Tournay school.

Professional classes have been instituted equally well at several other industrial schools. We may state, for example, the classes for dyeing at Verviers, and the weaving schools at Ghent and Verviers, and the courses of ornamental painting at Antwerp, Arlon, Courtrai, and Ghent. These schools have done good work, and their organization has been carried out without any difficulty, because they are not workshops for production, pupils only making sample pieces of the various fabrics. The inherent difficulty for the creation of professional schools for boys does not exist in the same degree regarding professional schools for young women, which are also comparatively of recent creation. They owe their existence to the initiative of benevolent persons possessed of progressive ideas, whose aim was to preserve the girls from immoral influences, and at the same time to give them such general instruction in practical and professional work as might enable them to gain a livelihood. These two classes of instruction do not present the inconveniences which occasionally result when the theoretical instruction combined with the practical in professional schools for boys. The trade that a young girl learns at a professional school can be carried out in her own room, and the necessary capital for its installation is so small as hardly to be worth consideration. It is not worth while going into the discussion as to the advantage or otherwise of providing workshops for the girls, as they are not absolutely necessary. All the professional classes where girls are taught comprise painting on porcelain and upon fans, designing lace, making artificial flowers, and embroidery, with bookkeeping, and sometimes wood engraving and etching, all of which can be taught in the school. Provided with a diploma of capacity, a young woman can at once make her own work remunerative, without any great expense in the installation of a workshop. In these institutions for technical instruction it is not absolutely necessary that the teaching should be gratuitous. The pupils often pay a small contribution, which does not seem to be an obstacle to their being well attended. A great number of purses are annually subscribed by the Province and the Municipality, and also by private individuals, to ensure payment for those pupils who aspire to follow courses and have not the means or the necessary qualifications for admission. Everybody knows that these professional schools for young women have done excellent work, and the number of similar institutions to those founded in 1865 prove sufficiently well how much they have been appreciated.

Brussels

Brussels, Antwerp, Liege, Mons, without counting the schools of secondary order established throughout the country, have imitated the example given by the founders of the school of the Rue du Marais, at Brussels, and at each one of these towns the desire shown by parents to educate their daughters proves how well this class of instruction has met a real want. It cannot possibly be otherwise—for do they not put into the hands of these young women a means of obtaining an independent livelihood, and prove the narrowness and injustice of the opinion that women are incapable of carrying out certain work for which they are eminently well adapted?—and can it be possible to doubt that this union of primary and technical education tends to make the young woman more industrious, as well as furnishing her with a better education? It must also tend to bring about habits of order and economy in the household which contributes so powerfully to the contentment of the family and the happiness of the home. Excellent results have been obtained upon this principle, but it can be well understood that the resources of private enterprise were insufficient to obtain all the maximum of success that has a right to be expected from such useful instructions. It was therefore found necessary that the municipalities should assist as well as the provinces and the State. These accordingly subsidised the institutions which have since become generally recognised of general and public utility. Four professional schools for girls are subsidised by the Government—one at Antwerp, two at Brussels, and one at Mons. The teaching comprises a general course of Flemish, French, arithmetic, history, geography, notions of natural science, hygiene, domestic economy, drawing, manual work, singing, and gymnastics, and the science of teaching and professional training. The programme of the general course is the same as that used in the primary schools. The professional course varies according to the school. Instruction is given in general design, the designing of lace, painting upon porcelain and stoneware, painting on glass, on fans, also upon woven fabrics, dressmaking, embroidery, and other millinery work; the making of artificial flowers, book-keeping, German, and English. There are some schools that furnish the pupils the stuffs upon which they work, and pay them wages, which are determined by the price of the sale of the various productions; these, however, are exceptional cases, and the system has given rise to a certain class of difficulties. In other places, on the contrary, schools exist where the pupils bring their own work, and charge themselves with the cost of the materials; more often, however, the instructor of the class provides the materials and occupies herself with the sale of the products.

The teaching given in industrial schools in Belgium is an elementary scientific instruction, and addresses itself directly to the people, and especially to all those who are occupied in handicraft industries. The classes are given in the evening after work, as convenient, and during the Sunday mornings from 9 until noon. This instruction is within the reach of all the working-classes, and its object is to give that scientific instruction which cannot be obtained in the workshops; to develop the intelligence of the workman in initiating him to the knowledge of the general laws which preside over the transformations of matter, and to take him away from the tyranny of routine by providing him with the means of enlarging his ideas, and by this means ameliorating his material condition. The instruction comprises two distinct parts, of which one is general for all industrial schools without distinction, and the other is special to each school, according to the local industry, so that the last year of the course, which generally runs over three years, is specially directed to those branches of industry which are in operation in the locality in which the school is situated. The first part comprises  
drawing,

drawing, together with all its applications, geometry, arithmetic, book-keeping, physics, chemistry, mechanics, hygiene, and industrial economy. The second part comprises metallurgy, the theory of stone-cutting, the working of mines, construction of buildings, weaving, dyeing, the application of electricity, and the management of the steam engine. Drawing is taught from the round, and copying from the flat and from engravings is completely banished from the classes. The first year the students draw with a free-hand upon a black-board placed in front of them, each one having his black-board in the class. With a piece of chalk they draw right lines and curves, geometrical figures, and other subjects. The second year they draw upon paper these outlines, also geometrical figures and their combinations. Isometrical drawing is also taught. About the commencement of the second year the drawing is made from actual objects, such as bolts, rods, plumber-blocks, heads of piston rods, and other portions of machinery. In the third year nothing is done with the exception of the application of drawing to actual work; all the sketches taken by the pupils are made from objects, and from these working drawings are made by means of rule and compasses. Pupils are instructed how to make finished drawings of machinery from their own sketches, both in plan, elevation, and section. This system is most excellent, and has given the very best results. The aim has been invariably to teach the drawing of actual work, and not to make the workman a draughtsman. Nevertheless, if the professor discovers among his pupils a student who has a special aptitude for drawing, he assists him in every way to become an accomplished draughtsman. But these are exceptions. The general rule is to teach pupils to make and understand a working drawing, so that it might assist them in their duties in the workshop. For example, to sketch a piece of a machine that is broken or worn out, to figure upon the sketch the proper dimensions in order to make a proper working drawing to scale, and to be able to furnish the patternmakers with any necessary information. This enables them to repair a machine, or construct any new portion that is required; in short, to be able to place upon paper, by means of a rough drawing, his actual thoughts. Pupils are received into the schools from the age of 12 or 14 years, according to the work and the localities; but it is necessary, before they are admitted, they should pass an examination in order to show that they are able to read, write, and cipher; without this indispensable knowledge they would be unable to follow the explanations of the professors. When this is the case they are sent back to the evening classes of adult schools to get the necessary elementary instruction. At the end of each year they pass an ordinary class examination, and at the end of the third year a general examination. Those who go up for this examination receive a diploma or certificate of capacity, and these diplomas certify and mention whether they pass with satisfaction, distinction, or with distinguished honors, according to the manner in which they pass their examination. Generally, those who are "distinguished" are immediately engaged by the leading manufacturers, who make it their duty to assist at these examinations. The juries are generally composed in such a way as to comprise the managers and foremen of the principal industries in the district in which the school is situated.

Both industrial and professional schools are institutions essentially municipal, and the greatest license is left to the officers of the municipality in the direction of these establishments. The municipalities engage the teachers, and furnish the necessary funds from the municipal taxes to provide for the cost of the school. They make the programmes of the courses and the rules by which the schools are governed;



governed ; in short, they administer the whole affairs of the school. The Government only reserve to the State the right of approval of these rules, programmes, &c., and that the Government should always be represented on the boards and committees of the school by one delegate or more, and that these schools should be submitted to the inspection of the State officers on account of the subsidy allowed.

The total actual cost to the State for the whole of the thirty-five schools amounted to 566,282 francs (£22,650); for each school, 16,180 francs (£645 4s.); or at the rate of 53 francs (£2 2s. 6d.) per pupil.

In these expenses the State pays 38 per cent. ; the provinces, 16 per cent. ; and the municipalities, together with subscriptions from private persons and various other sources, 46 per cent.

The four professional schools—Tournay, Antwerp, and the two girls' schools in the Rue du Marais and the Rue du Poinçon, Brussels—have cost 144,145 francs (£5,765 15s.), or 36,000 francs (£145) for each school, and 166 francs (£6 12s. 10d.) for each scholar.

The thirty-one industrial schools have cost 442,136 francs (£17,685 3s.), or 14,600 francs (£584) per school, and 43 francs (£1 14s. 3d.) per pupil. The number of professors attached to the industrial and professional schools is 364. The number of certificates of capacity delivered in 1884 amounted to 384. The total number of scholars was 10,704—9,137 for the industrial schools, and 867 for the professional schools—thus giving an average of 305 pupils per school. There has been since 1879 an increase of 2,417 pupils, or 43 per school. Great difference exists between this average figure that we have given of 305 pupils per school ; in fact there is one school with more than 1000 pupils—Ghent, 1,165. There are five with more than 500 pupils—Charléroi, 988 ; Brussels, 686 ; Chatelet, 625 ; Morlanwelz, 596 ; Liège, 523. Seven have between 300 and 500 pupils—Namur, 495 ; Verviers, 410 ; Seraing, 409 ; Monceau, 364 ; Brussels—Rue du Marais—350 ; Jamioulx, 309 ; Antwerp, 301. Four with more than 200—Brussels—Rue du Poinçon—281 ; Courtrai, 236 ; Jumet, 232 ; Hodeng—Aimerics—212. Fifteen schools have an attendance of over 100 pupils, and only three with less than 100.

This is a very concise statement respecting technical instruction in Belgium, from M. Rombaut's own opinions. The results that have been obtained, when taken in connection with the comparatively small sums expended, are very satisfactory, and the number of pupils somewhat extraordinary, considering that the whole of Belgium only contains some five and a half millions of inhabitants. The Government has always shown the greatest interest in endeavouring to ameliorate the situation of existing schools of this character, and also to create new ones on each occasion when solicited by the municipalities.

I am aware it may be said of a colony, or of a young nation, with a vast unpeopled territory, capable of sustaining as many millions of inhabitants as there are now thousands, that its first care is to bring the land into cultivation, to make roads and bridges, to build towns, and make provision for the future. This cannot be denied ; and it is in order to make beneficial arrangements, which have in view the future greatness of the Australian nation, that the foundation of artistic and technical education should be founded on the rock of experience. While Australians may at the present time be content to import from other countries their paintings, sculpture, furniture, and generally all objects of art, the time is fast approaching when this state of things will be entirely changed, and Australia will have an art and a distinct school of its own.

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To incur a heavy expenditure at first cannot be avoided, but to make this with a thorough confidence of a successful result, as regards the teaching of the people, is certainly one of the best uses to which the people's money can be applied. The two last generations in Australia have been engaged in a constant struggle with nature to subdue it to their requirements, in order to gain first a livelihood, and afterwards wealth. In every country something of the same sort has taken place, and art has been preceded by energy in the field of action, whether in fighting for liberty or against the forces of nature. The fathers leave the history of their trials, their struggles, their victories, to their children, who in carrying on the work of their ancestors, and having more leisure, desire to perpetuate their mighty deeds by painting and sculpture and harmony, so that future ages may be incited to emulate their glorious achievements in arms, in art, and in song.

The history of our nation is not however confined to Australia. We have an equal right with every Anglo Saxon to share in the glorious traditions of the English nation. It is the same blood that flows in our veins that gave our British fathers that courage, energy, and perseverance which beat down every obstacle and surmounted every difficulty in establishing that liberty which made England famous and brought forth that inventive genius which has given her the first place in the history of nations. The entire British race, wherever they may settle, either in America, Europe, Asia, Africa, or Australia, carry their traditions with them; and as leisure succeeds the efforts in making a home, so assuredly will the art follow which carries to posterity the features, the characters, and the representation of the great achievements of those men who made themselves a name and became conspicuous among their fellows.

Australia is to-day what the United States of America was ninety years ago. The energy that has brought forth a nation of 60,000,000 from a group of colonies in the north will most certainly do as much in the south. The liberty so dear to every one of British blood cannot fail to produce the same grand results in these southern colonies, which are just now coming to their hundredth birthday, as to those northern ones, which, when having attained more than twice that age, had not a greater population, or had achieved half the distinction in science and art which belongs to this great south land.

It will be well to show as well as I possibly can that there is an imperative necessity to teach the youth of a country to make the best use they possibly can of their hands, for it is a fact beyond dispute that labour is the lot of mankind, and that the great masses of the people have to labour early and late to gain a livelihood. It has always been my opinion that education should be general, and that everyone, rich and poor alike, should learn well and truly to get his own living by the work of his hands. If it is necessary at all for the State to expend a tenth part of its revenue for the purposes of education, then let that education be general. The democratic spirit is altogether too strongly rooted in the freedom given to the people of New South Wales for them to retrograde; and as the money so expended is the money of the people, I cannot conceive it wise to apply one system of education to the working-classes, and another to that of classes well-to-do. This is entirely against the spirit of the age, and can only be calculated to develop that caste feeling which has already commenced to make itself felt in the Colony. If there is to be one class of education for the rich and another for the poor, we shall only develop priggism on the one hand, and bad feeling on the other; and tend to separate morally and intellectually the two great social elements of capital and labour.

I am deeply impressed with the desirability of bringing up the children of the people at the same schools, and teaching all, without discrimination, to work. The public schools are of quite a sufficiently high character for the children of the most wealthy, and I can conceive nothing that would conduce more to the development of that social good feeling which would naturally ensue if the children of all classes received their education on the forms of the same school. It is the means *par excellence* of engendering sentiments of confraternity among children of all conditions, and this is proved indisputably by the English public schools. To have been an English public school boy, whether the son of a duke or a country parson, is a patent of equality; and the same result would be brought about if the children of all classes received their primary education in the Government public schools. The separating effect which must ensue between the two systems, the one receiving his instruction at the academy for young gentlemen, and the other at the public school, must necessarily produce and always has produced deplorable effects. Jules Ferry once said, and I quite agree with him, that "caste ideas would vanish when tools were found in schools alongside of maps and books; the nobleness of manual labour would be perceived and concord would be spread."

It will no doubt be asked what effect has technical education exercised upon industry, and what good has it done the industrial classes? Are the methods pursued in Europe suitable for Australia? With respect to the first question, there can be no doubt that this class of instruction grows in popularity every day throughout the length and breadth of Europe. National governments and municipalities vie with each other in establishing technical institutions as a portion of their system of education, and the most eminent European authorities, competent to form an opinion, have recorded their appreciation of the system, and advised its extension. This opinion appears to be universal in every country, however different may be their form of government, for it is quite as pronounced in autocratic Russia as among the democracy of Switzerland. The masses must not only be taught to read, write, and cipher, but to get their own living. Every assistance must be given to enable young persons of both sexes to gain that professional instruction as may enable them to gain a livelihood, and to better their condition both socially and morally. It may be said with truth that all civilized nations and peoples recognize the necessity for industrial education, and absolutely vie with each other in the method and system to be employed in giving this instruction to those who are engaged upon their national industries. No greater good can possibly be conferred by a State than giving such education to its people as will enable them, not only to compete favourably with other nations, but to distance them in the race. Our industrial classes rely upon their trades for a subsistence, but if they are less skilful than the artizans of other nations, then competition becomes impossible, and the workmen thrown out of employ. In my opinion, the only way to avoid this is to keep the workman well educated in his own trade.

The Royal Commissioners on Technical Education say, that although the Paris Exhibition of 1878 had led them to look for great progress on the Continent, they were not prepared for such a remarkable development of natural resources, nor such perfection in foreign industrial establishments as they found existing. They ascertained that a great deal of machinery of almost every kind is now made abroad, quite equal to our own, and adapted to its purposes with as much intelligence and skill. In many new chemical processes, such as the preparation of artificial colours from coal tar, they found that Germany unquestionably takes the lead,  
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and that in the preparation of soda, the economical production of coke, the recovery of tar and ammonia from coal, the ventilation of deep mines, and the scientific construction of roofs and bridges, we are only slowly following in the footsteps of our Continental neighbours. They go on to say that the English are behind them again in the manufacture and design of the highest class of cotton printed fabrics, while the woollen cloths of Rheims and Roubaix are superior to those of Bradford, especially in the dyeing, and the silk weaving and dyeing of Lyons are still pre-eminent. Intelligence, perseverance, and thrift, combined with cheap labour, enable the Belgians to manufacture woollen yarns, which find a ready market in Scotland, while the establishment of new textile industries, such as the ribbon trade of Basle, the velvet and silks of Crefeld, and the mixed fabrics of Chemnitz, denote a vigour and enterprise not excelled by anything of a similar nature in England. The success with which our neighbours abroad have thus been trained to compete with us is due to a more general cultivation, to the knowledge of modern languages, and economic geography, as well as to a greater carefulness and adaptability of character, all of them developed by the technical high schools which exist in nearly all the Continental states, and which are maintained for the special benefit of the artisan.

The Commissioners also draw attention to the efficient technical instruction provided in the ordinary German Universities, especially as regards chemistry; and reference is made to the fact that much of the prosperity in their large manufacturing works would not have been achieved but for the facilities which these Universities offer for original scientific research. They also point out that in many prominent respects the education of Continental artisans is more extended than with us. Elementary instruction is more generally diffused in Germany and Switzerland, the systematic teaching of drawing being the most striking feature. Free lectures and classes in every subject of interest in science, art, and literature are conspicuous in every scheme of popular instruction. In such crowded cities as Brussels, Paris, and Lyons, the multitude throng the evening school, and receive gratuitous instruction in drawing, modelling, carving, and painting. Applied art is thus stimulated to a degree unknown on this side of the Channel. All museums and celebrated collections of art are open to the public on Sundays, while lectures and trade classes are also held on this day.

This wonderful progress is entirely due to the care bestowed upon technical teaching. Especially has the drawing classes contributed to this, as good taste and correct judgment are always more or less learnt from a constant exercise of good bold freehand drawing, and in the recommendation that drawing should be incorporated with writing as a single elementary subject throughout all the standards, I am highly satisfied. In my report in 1879 I recommended this class of teaching. Moreover it must be honestly taught by teachers who know their work, and who are prepared to do their duties faithfully. Those teachers who are not expert at freehand drawing should not fail to make themselves so as early as possible. They should practice the lesson they intend giving until they can do it fairly well; then they inspire the children with the desire to make their hands equally subservient to the will. The model, whatever it may be—a jug, a vase, a teapot, or anything else—should always be there to be drawn from, and, to show the pupils how to do it, the teacher should make a sketch of the object on the blackboard, the pupils looking on. The blackboard with the teacher's design is then to be turned round, while the pupils make their drawing from the object. At the end of the lesson the pupils may

may be allowed to compare their drawing with the teacher's, and draw their own conclusions; while, afterwards, the teacher will inspect each one's work separately, and correct and instruct in as gentle a manner as possible.

In the kingdom of Wurtemberg there have been established more than 400 drawing schools. This organization is of recent date, only dating back some score of years. Before ten years had elapsed it had led to the most decided improvements in the manufactures of the country.

Experience has proved that technical education to be in the highest degree useful and efficient must begin in the infantile primary schools, and based upon a solid foundation of eye and handwork from the earliest school life. Then comes the question how technical education can best be given, and here, again, there is great diversity of opinion, and this has chiefly been brought about by the change that has taken place in the system of apprenticeship. Fifty years ago, when a youth was apprenticed, his master contracted to teach him his trade in return for a certain term of service, and both parties to the agreement took care the conditions were fulfilled. Lord Shand says:—"The relation of master and apprentice was almost paternal in its character, and the young workman obtained from his master or from some skilled workman immediately over him, and charged with the master's duty in that respect, such technical instruction as the master or workman respectively was capable of giving from his own knowledge of the business." This system is now entirely changed. There is no paternal relation between master and apprentice, as the business, if large, is, probably, in the hands of a joint stock company. The apprentice must pick up his information where and how he can, and, unless he can succeed in obtaining the interest of some good workman on the establishment, he is never likely to acquire anything like a real knowledge of his business.

A most graphic description is given by Mr. Silvanus P. Thompson of the modern apprentice. "He, the apprentice, is placed in the manufacturing workshop under a journeyman carpenter, who is supposed to look after him, but who, having his own work also, and not being paid to teach apprentices, nor, indeed, qualified to do so, loses no opportunity of neglecting him. The boy must do some work, so the first odd job that may be supposed easy enough is set before him; he has the very vaguest instructions given him, and nobody troubles to explain to him the difficulties he will encounter, or tell him how to overcome them. He spoils two or three pieces of wood before he has produced anything, and is simply sworn at or threatened with blows at each failure. Of instruction there is none, for the workman who ought to have instructed him, could not do so if he would, having been reared under the same vicious system; and would not if he could, as he has no mind to be displaced by a clever young workman, who could do his work for less wages. So the lad learns, with weary months of aimless and unsystematic labour, to ape the tricks of the elder workmen, falling irrevocably into their worst methods and acquiring their slang talk. He is, of course, a perfect slave to the inaccurate "rules of thumb" handed down in the traditions of the shops. At first, before his hands have acquired any rude kind of skill, he is the common drudge, must run for one man's coat, and for another's tobacco. From the moment when he has obtained some skill with his fingers he must be continually producing paying work, and so, without regard to that which would be best fitting for him for doing further work, he must drudge on, plaining mouldings or shaping legs of stools by the year together. He does not know how to describe his work; could not read his instructions aright if given him

as they ought to be, in the form of a working drawing, much less could he himself set out a working drawing for another to work by. So he grows up an uninstructed uneducated bad workman, and having served his seven years of apprenticeship duly, cannot well be forbidden entrance to that haven of bliss, the union of his trade, where having entered, he can claim to be paid at least as well as his fellow workman. And this is apprenticeship."

Mr. Galloway says the school or college cannot be substituted for the workshop or manufactory. He says he is aware that this is being attempted on the Continent, but that such substitution is not at all adapted to England. That hitherto England has been the workshop of the world, and from the natural desire to change such a state of things and to cripple England's technical supremacy, that State workshops and technical schools have been established. This is only partially correct. It is quite natural for the government of every nation to desire to see its people improve and progress in all manufacturing industries, and in order that they should progress in the right way, surely the duty of the state is to instruct and direct, and, whatever may be said to the contrary technical schools are found to be the safest and best guides in this direction.

Chas. Burton says "that as the quality of work is final, no nation being able to attain to more than well designed and thoroughly good work, foreigners will pass us if we abate in earnestness and speed, but will overtake us if we keep at our best. England cannot reasonably expect for ever to monopolize the work of the world." Technical education is generally diffusing manufacturing knowledge all over Europe, and in Belgium, Germany and, France, the people thoroughly understand what is meant when they say practice with science.

It had become apparent, even to the Government of England, that in many branches of trade and manufactures for which the British artizan had been celebrated that he was fast being outstripped by workmen of other countries—France, Germany, Belgium, Switzerland, and the United States of America. There can be no doubt, whatever Mr. Galloway may say, that in all these countries, the people have become convinced of the immense importance of providing special training for artizans and skilled mechanics, and especially for such young men as may be engaged in learning any handicraft. These nations have all contributed liberally and wisely, and have, at great expense, erected schools, colleges, and museums, with all appliances for giving a thoroughly practical education. I must take this opportunity to speak generally of what has been done. The practical monopoly of trade by Great Britain engendered that false security that is always so hurtful, and proves sometimes fatal. Absence of competition from without caused Englishmen to think that the foreigner was ignorant and incapable; and so he was, until he became thoroughly awakened to the necessity for making his own machinery and spinning and weaving his country's clothing. These foreigners, however, set to work in the right way. They built schools and organized a thorough system of technical education for the special benefit of the manufacturing and industrial classes. They imported machinery, copied it and improved upon it, and continually progressing, they now absolutely compete with England on her own ground. It is clear that technical education must be furnished to our artizans, otherwise the foreigner will soon take the lead in all those mighty industries that have made the glorious commercial prosperity and the immense wealth of Great Britain.

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In technical education Switzerland has progressed as fast, or faster, than perhaps any other country. Elementary instruction is compulsory until the child is 12 years of age, and is then carried on by the Pestalozzi method in the most thorough manner by well arranged object lessons. At the age of 12 pupils can enter the gymnasium or go to the university. On the contrary, if they are to acquire a scientific or commercial education, they go to the secondary schools, from thence to the industrial schools, and on to the polytechnic. Diagrams of Austrian and Bavarian instruction made by the French commissioners in their report on technical instruction in Germany and Switzerland, and which Mr. Galloway arranged as a genealogical tree, are given in Appendix, together with a full description, which will be found extremely interesting.

Russia, wishing to create a home market for her people, prohibited, under penalty of confiscation, the importation of all these articles which could be manufactured at home. In order to teach her people how to do this in a better way she has established technical schools of the most complete and practical character. The Imperial school of Moscow is one of the best arranged schools in the world. It combines theoretical and practical education, and is enabled to present real proofs of the possibility and advantageousness of such combination. The trial of this school and workshop combination has been made on an extensive scale, and has now extended over a considerable length of time, playing a most important part in the development of Russian industries. I gave an account of this school in my "report on school buildings" in 1879.

Educational authorities in America report that a certain amount of irregularity and non-attendance at school, caused by extreme poverty, want, and vagrancy, invariably exist in great cities, and this is exciting the greatest attention in all the countries I visited, because it is an established fact that it is from the children included in this category that the criminal class is furnished and augmented. To bring these children under proper instruction is the desideratum, and the regular school has been found inoperative. Primary education is no deterrent to crime, a fact that has been proved over and over again. It may change the class or character of the work, but the criminal spirit exists, and is made more subtle and clever by education. The reason is obvious. Primary instruction does not give the child a chance to earn an honest livelihood, consequently the habitual instinct of living by one's wits, so to speak, is not combated. In many places in New York the wants of this class are met by the corporate schools.

Mr. C. Loring Brace writes:—"There are thousands of children in this city who are left in utter poverty, often without breakfast in the morning, half clad, ignorant, and exposed to every temptation. They naturally form our notorious criminal class. On the other hand, we have a series of board or free schools, with an organization and a standard too strict and high for street urchins, which could not, without serious dangers, assume an eleemosynary character by feeding and clothing the little wanderers of the streets. How have we reconciled the two? Simply by creating through voluntary effort an intermediary system—that of the day industrial or corporate schools. These are founded by private associations, and only receive by act of legislature a part, say one-half, of their support from the school tax on ratepayers proportioned

portioned to the sworn average attendance. The rest of their income comes from private benefaction. They are under the rules and regulations of the school board, and are examined annually and inspected occasionally by the officials. The industrial schools, both day and night, are under private trustees, who appoint their own teachers and provide their own funds (except the annual tax appropriation), but who conform their course of studies more or less closely to that of the board schools. Their object is to gather in the street children—runaways, truants, little bootblacks, newsboys, and all the nondescript crowd of half-vagrant boys and girls who used to infest the New York lanes and alleys. They give them one or more meals in the day, clothe them, as they earn the clothes or shoes by good marks, cleanse them, train them in common school studies and some branch of industry, and then after a time forward them on to the board schools or to places in families, or at trades or on farms. The children are not overstrained, for they have brain-work varied by hand-work. They do not suffer from headaches, for food is given to the most needy; the hours are not long; some have simple gymnastic exercise, and all get a week or two in the country at summer. Then many of them take necessarily half-time sessions, because they are supporting themselves and families by street trades. Irregular attendance has to be permitted. The average annual expense per head, including cost of food, clothes, fuel, rent, and salaries, is only about £4 per head, reckoned on the daily average attendance. There is also an institution known as the Children's Aid Society, which, besides carrying on these industrial schools, has many boys' lodging-houses."

De Fellenberg, had come to the determination to begin the work of industrial education, and the only question with him now was to find an able assistant who could fill the position of "Father" to his pupils, and as such embody the idea. After having sought among a considerable number of young men of the educating class in Switzerland he found the right one, in the following manner:—Pestalozzi's method of teaching had excited great attention among all engaged in education in Switzerland. It seemed so simple to lead the pupil by enlisting his own will, and rousing his own reason to assist in his own instruction, that every reflecting teacher could only wonder why the idea had not occurred to him long before, as the number of children in a school rendered some such method almost necessary. Many, therefore, endeavoured to apply what they had heard of his system, apparently so simple, to the subjects then taught in their schools—reading, writing, the catechism, &c.; but they soon found the task to be much more difficult than they imagined. Many, therefore, were anxious to study the Pestalozzian method from Pestalozzi himself, but this was too expensive for most of them. The pecuniary affairs of the institute were so involved from mismanagement that Pestalozzi could not admit any such supernumeraries except for a considerable sum. This led De Fellenberg to think of opening a course of instruction in the Pestalozzian method—on the one hand, to offer to earnest teachers this opportunity of improvement; on the other, with the hope, among the numbers who might assemble at Hofwyl, to find an assistant for his own particular object. He communicated his scheme to Pestalozzi, who was delighted with it, and sent him a young man from Prussia, named Leller, no less thoroughly imbued with his method than enthusiastic in promoting it. De Fellenberg was thus able to open his course of instruction on the 1st of May, 1806. For this purpose he had a cottage built in a little wood, beneath great linden trees, on twelve posts, and with a single roof. The upper part served as a sleeping-room, the ground floor as a schoolroom. In the morning,

morning, the hours from 5 to 7 and from 8 to 12 were devoted to lessons. In the afternoon the teachers worked in the fields and in the gardens of Hofwyl. In the evening they prepared the vegetables for the next day's meals. During the harvest they assisted in the fields during the whole day. De Fellenberg in this way showed them how an industrial school ought to be organized. He gave them, also, every morning a lesson in agriculture, in which he explained the various field operations and their connection. He conversed with them on the subject of making agricultural labour a valuable aid in education, and a subject of instruction for boys. Each evening he talked over with them the labours of the following day. Thus he led the teachers to do their work with intelligence, to take pleasure in it, and to see how advantageous would be to themselves the knowledge thus obtained of agriculture, so that means of making the soil more productive during the rest of their life, for most teachers in Switzerland depend for the principal part of their subsistence on a few acres of public ground.

All this instruction was in accordance with Pestalozzi's ideas. De Fellenberg even carried them further than their originator, for Pestalozzi, based his system on the perception of the senses, making this the groundwork of memory. Former systems had only concerned themselves with the memory, and with matters which could be made objects of perception. De Fellenberg then went beyond Pestalozzi, inasmuch as he added the action to the perception—"for," said he, "what has been done, and done with thought, will be retained more firmly by the memory, and will bring a surer experience than that which has been only seen or heard." Earlier schools made the *ear* and *words* the subject-matter of memory—Pestalozzi, the *eye* and *picture*—De Fellenberg, the *action*—Leller, though versed in Pestalozzi's method, followed De Fellenberg's steps in advance of it, with the readiness of one desirous of improvement, and brought his objective teaching as far as possible into relation with the daily lessons of the teachers, the effect of which was to render them more interesting and animated. The teachers who took part in these courses of instruction have been heard even years after to describe the scene so vividly that it seemed as if they had just come from it, and it has been often proved that whilst other teachers, from want of knowledge of farming, have been ruined in times of distress, such as 1816, 1817, the Hofwyllers, as they were called, struggled out of their difficulties by their own exertions.

About thirty joined in the first season's lessons. These, on their return home, mentioned them to their acquaintances. The following spring no less than eighty teachers made their appearance at Hofwyl. This influx created difficulties for De Fellenberg, as an individual, and caused him some pecuniary embarrassment. In order to carry out his plans he was obliged to find different kinds of labour, which he would not perhaps otherwise have thought of. Among these was drainage, then effected only by stones, or with wooden pipes; and as the Hofwyl land was extremely stony this answered two purposes at once. The drainage water also was turned to account in watering the low-lying meadows. All these occupations again gave Leller the opportunity of extending his object lessons. Instruction in drawing was joined with them; this art being regarded by De Fellenberg and Leller as a connecting link between preception and action.

The second course was attended by a little schoolmaster named Wehrli, from the canton of Thurgovie. Although an elderly man, he had set off, on hearing of the new mode of teaching, and travelled on foot about 150 miles in order to improve



himself in his profession. He was one of the most zealous and attentive students, and endeavoured to inform himself as thoroughly as possible on all points that were new to him. When De Fellenberg at times explained to the teachers how agricultural labour might be made a means of education, declaring his own wish to establish an example of such industrial training, if he could only find a capable assistant, it was always old Wehrli who had most questions to ask after the lesson, and at the end of the course he said that he had a son whom he could recommend to carry the plan into effect. Induced by his description of his son, De Fellenberg invited him to Hofwyl, and shortly afterwards there appeared before him a youth of 18, with a pleasing expression of countenance, modest bearing, but fearless glance, commissioned by his father to enter the service of De Fellenberg. Young Jacob Wehrli was not long in comprehending what De Fellenberg required of him; he only wished as soon as possible to be put in command of boys with whom he could set to work. De Fellenberg was so convinced of the certainty of success in his undertaking that he did not hesitate to give the first beggar-boy that he found as a pupil to young Wehrli. Wehrli was no less confident in its being an easy task to change the most unmanageable of vagabonds into an industrious member of society; and in fact the first few weeks of kind treatment, not omitting better food, seemed to make the desired impression which De Fellenberg and Wehrli ascribed to their system. The result was, however, not a little attributable to Wehrli having shared all the occupations of his pupil, so that when the boy felt weary or idle he was ashamed to let his master, as he called Wehrli, work alone. When, however, after a few weeks, the better food and kindly treatment were no longer new, the beggar-boy began to long after his former "free life," and tried, instead of working, to go after birds' nests, the eggs of which had formed the luxuries of his former diet, or else he sought out a snug corner to sleep in. When Wehrli said to him, "Those who will not work shall not eat," he took up his tools again, it is true, but as his thoughts were not in his work his labour was worth nothing, and Wehrli saw that he should not attain his purpose in that way. So it was necessary that the boy should experience the consequence of his idleness, and go to bed one evening without his food. "What," thought he, "I am deprived of my liberty, and must hunger into the bargain," and the next morning very early he took his departure. Thus Wehrli had now no pupil. De Fellenberg himself was astonished that the beggar-boy had not known better how to appreciate his kindness, and he then made a fresh experiment with the son of an industrious labourer, who, burthened with a large family, was glad of the opportunity of providing for one of his children. He was a weakly boy, but willing and anxious to learn, and gave Wehrli more satisfaction. It was not so wonderful that a child out of a labourer's family should be trained to industry. Still it was attended with much trouble to accustom the boy, somewhat enfeebled by his mother's care, to field labour. De Fellenberg had said that they would not take a second boy till the first was in good order, that the example of one might influence the other. The prospect of such a result with this weakly boy was unfavourable, and Wehrli found that he should have to go through the whole winter with but one pupil. At the beginning of the cold days, however, our young friend, the beggar-boy, made his appearance, and promised if he were received back to work hard for his bread. It really seemed as if the young vagabond had instituted some comparisons between his "free life" and Hofwyl training, to the advantage of the latter. The two new comrades soon strove which should do his work best—a contest in which the beggar-boy soon got the upper hand, and took the position of teacher, as he displayed much more skill and aptitude than the other. This satisfied his

his ambition, and Wehrli took care not to weaken this first germ of civilization in him but rather endeavoured to convince De Fellenberg that they might now receive a third boy ; as he had a strong and intelligent assistant in the beggar-boy, and could at least depend on the good will of the other lad. Soon there followed a third and a fourth, but care was taken not to increase the vagrant element till the united strength of the little family might make it safe to do so. This was the commencement of the Agricultural School for the Poor at Hofwyl, in which the objective teaching of Pestalozzi was brought into action in concurrence with labour.

As a result of long continued deliberation, in the light of much practical experience, the Boston Committee on Industrial Education submit the following plan for organising manual training as a part of the course of instruction in the public schools :—

The shop work adapted to the purposes of general training in the mechanic arts is of two kinds—

(1.) That which is done at a bench with simple hand tools.

(2.) That which requires the aid of machinery and steam-power.

The first kind is elementary in character and preparatory to the second, so that it is convenient to speak of the one as elementary, and of the other as advanced manual training.

Advanced instruction in mechanic arts can only be provided for in a central school, but elementary instruction can be provided for on a large scale and economically, in such a way as to give a two-hour lesson once a week to all the Grammar School boys who are proper subjects for such instruction.

Suppose a teacher of carpentry, for example, occupying a conveniently situated room, provided with twenty benches, twenty sets of tools, and a quantity of stock, to be visited each half day in the week by successive delegations of twenty boys from the different schools in the neighbourhood. Each delegation would be simply excused from attendance at the Grammar School on the appointed half day each week, and attend the carpenter's class instead. The lesson for each delegation would last two hours, although boys interested in their work and not neglecting their other school-work might be allowed to stay another hour. The rest of each day would be required by the carpenter for the inspection of the boys' work, care of the tools, and preparation for the next lesson. Working thus he could give instruction to 200 boys in the course of the week (twenty boys each half-day for five days). The room, the tools, and the teacher's time would be in constant use, so that the greatest economy practicable in that regard would be secured.

Experience shows that the largest number of pupils to be taught at one time is twenty-four.

These elementary manual training schools need not of course confine their work to carpentry, there are other kinds of work. Bench and vice-work, also of an elementary character, the provision for which would be simple and inexpensive. Carpentry has for choice the first place, therefore it is with this handicraft work should be commenced. The cost of some of these elementary manual training schools in the United States of America is as follows :—

<i>Outfit—</i>					£	s.	d.
Tools, twenty sets at £5	...	...	...	...	100	0	0
Benches, twenty places, £2	...	...	...	...	40	0	0
Miscellaneous fittings and tools	...	...	...	...	30	0	0
					<hr/>		
					£170	0	0

*Running*

<i>Running Expenses—</i>					£	s.	d.
Salary of Instructor	...	...	...	...	240	0	0
Stock...	...	...	...	...	60	0	0
Repairs, replacement of tools, &c.	...	...	...	...	30	0	0
					<hr/>		
					£330	0	0

Cost of instructing each boy two hours per week  
for one year ... .. £1 12 3

The advanced instruction in mechanic arts, to be provided for in a central school, would require no other facilities than those already possessed by the city, except a suitable forging and machine shop. As all the boys in such a school would spend three-fifths of their time in drawing, and in book studies they could be well accommodated for that part of the time in the ordinary class-rooms.

Professor Woodward says :—

“ Your shop teacher should be well educated and a natural teacher. Don't relegate manual training to a janitor. In a small school the shop teacher may be also the drawing teacher, or the teacher of physics. He should be paid as well and rank as high as any assistant. Beware of experienced mechanics who are reputed to be fine workmen, for they will scarcely appreciate your object, and will find it easier to do the work themselves than to teach pupils to do it. A bright young teacher who understands drawing can, under a good instructor, learn all the woodwork, necessary to begin with, in thirty days of three hours each. If you fail to find a good teacher don't get any ; you can afford to wait ; you cannot afford to fail.”

It has been established beyond dispute, by every educational authority of eminence that technical education is necessary to properly form the artizan. What is therefore of the greatest importance is the manner in which it shall be given, and the nature of the instruction. It may be theoretical or practical, or both. It may confine itself to the teaching of the application of scientific principles to industry, or may educate the pupils in manual dexterity. There can be no doubt that a combination of these is the great desideratum, but the question remains as to how it is to be accomplished. Many authorities aver, that while the school is the proper place to learn the application of theoretical and scientific principles, the workshop is the only place in which to learn the manual dexterity, without which it is impossible to become a skilled artizan.

Without condemning any of the arguments adduced by many eminent men, who argue the question as advocates either for or against apprenticeship schools, I may say at once that I believe the middle course the safe one, and that out of the many and excellent experiments made by the Municipality of Paris, the true solution of the problem will be found. When to the success obtained by the Parisian authorities in their many and varied experiences, is added the results obtained by the introduction of manual training in the Swedish schools, as well as what has been accomplished in the United States of America, it must be admitted that it is possible and comparatively easy to prepare the masses of children by a system of manual training in the primary schools to acquire that dexterity which can only be got by early practice in the use of tools. This instruction is not intended to make a tradesman of a pupil, but simply to give the hand-training necessary to use the hammer and chisel, the saw, and the plane.

It

It can be easily understood that it would be next to impossible to furnish every primary school or technical class-room with the plant and machinery necessary to make the children of the people handicraftsmen in the true sense of the word. Moreover, the material employed, when the articles produced were precluded from being sold, would be considerable; for I admit the same reason would apply to goods produced by the school, as to that applied to those manufactured by prison labour, when brought into competition with articles produced by the legitimate tradesman. Here, therefore, the State would have to pause and consider thoroughly this part of the question, for while it may be argued that school furniture and fittings, for example, might, in all fairness, be constructed by the scholars, on the contrary it would not be fair that schools should produce articles of a domestic kind that is ordinarily supplied by tradesmen. The great object to be attained is to prepare boys to become practical dextrous workmen and scientific craftsmen, and the preponderance of evidence goes to prove that this can only be done by commencing, at an early age, to give to the hand and eye of the scholar the dexterity and accuracy that are absolutely necessary to the accomplished operative. It will be found before long that it is imperatively necessary to the progress and development of mankind that all children, irrespective of class, shall be made to acquire facility and dexterity in hand-work.

In writing of the English people, a clever journalist lately said: "If we are anything at all we are industrial commercial and manufacturing, and a nation which has to purchase half its food by the exchange of its wares for the products of other countries, and which cannot do anything great or grand without spinning, weaving, mining, smelting, forging, rolling, turning, and grinding for it, must not despise mechanical and mercantile employments or omit preparation for them. There never was so great a necessity for progress in scientific industry as there is at this day, though we cannot say that we discover a sufficient sense of the necessity."

"Both in England and abroad it is generally felt that the old apprenticeship system is no longer sufficient to make operatives fully conversant with the 'mysteries' of their craft. The introduction of machinery into nearly every branch of industry has greatly changed the character of the relationship that formerly existed between the master and his apprentice; and the application of science to industrial operations has, in not a few cases, transferred from the foreman or works' manager to the practical science teacher the key to these mysteries, and has rendered necessary for workmen of every grade a different kind of training from that which was considered sufficient not many years ago."

Sir Philip Magnus, one of the most distinguished authorities, and certainly one of the most experienced, says: "It cannot be too often repeated that the object of workshop practice, as a part of general education, is not to teach a boy a trade but to develop his faculties and give him manual skill; that although the carpenter's bench and the turner's lathe are employed as instruments of such training, the object of the instruction is not to create carpenters or joiners, but to familiarize the pupil with the properties of such common substances as wood or iron, to teach the hand and eye to work in unison, to accustom the pupil to exact measurements, and to enable him, by the use of tools, to produce actual things from drawings that represent them. The discipline of workshop instruction may be regarded as supplementary to that of drawing, with which, however, it should always be associated, as teaching a knowledge of *substance* in addition to that of *form*.

Moreover,

Moreover, under competent instructors, it may be made an instrument of education similar in many respects to practical science. In the workshops the operations to be performed are less delicate, the measurements are not required to be so exact, the instruments are more easily understood, the substances employed are more ordinary, but the training is very similar, and in so far as the faculties exercised are those of observation rather than of inference, the training, educationally considered, is a fitting introduction to laboratory practice. At the same time the skill required in the workshop is particularly useful to the laboratory student in enabling him to make and fit apparatus, and in giving him that adroitness on which progress in scientific work so much depends. But whilst a certain amount of manual training is valuable in the education of all persons—a fact which is already recognised by the head-masters of our secondary schools—the usefulness of this kind of training is much greater in the case of the children of the working-classes, whose education is too limited and often too hurried to admit of any practical science teaching, such as older children obtain, and to whom the skill acquired is of real advantage in inducing in them an aptitude and task for handicrafts, in facilitating the acquisition of a trade, and possibly in shortening the period of apprenticeship, or of that preliminary training which in so many occupations takes the place of it.

An objection is sometimes raised to the introduction of manual training into elementary schools on the ground that as the children of the working-classes necessarily leave school at an early age, and spend their lives for the most part in manual work, such time as they can give to study should be occupied in other pursuits—in cultivating a taste for reading and in the acquisition of book knowledge. This objection is due to a misconception of the true objects and aims of education, and to an imperfect knowledge of what is meant by workshop instruction. To assume that the best education can be given through the medium of books only, and cannot be equally well obtained from the study of things, is a survival of the mediævalism against which nearly all modern educational authorities protest. But there is another and more deeply-rooted error in this argument. People often talk and write as if school-time should be utilised for teaching those things which a child is not likely to care to learn in after life, whereas the real aim of school education should be to create a desire to continue in after life the pursuit of the knowledge and the skill acquired in school. In other words, the school should be made, as far as possible, a preparation for the whole work of life, and should naturally lead up to it. The endeavour of all educators should be to establish such a relation between school instruction and the occupations of life as to prevent any break of continuity in passing from one to the other. The methods by which we gain information and experience in the busy world should be identical with those adopted in schools. It is because the opposite theory has so long prevailed that our school training has proved so inadequate a preparation for the real work of life. This was not the case in former times; and the demand for technical instruction, both in our elementary and in our secondary schools, is a protest against the contrast which has so long existed between the subjects and methods of school-teaching and the practical work of every day life.

\* \* \* Now in order that manual training may serve the purpose of an intellectual discipline, the methods of instruction must be carefully considered. That the training of the hand and eye, and the development of the mental faculties, are the true objects of the instruction, should never be lost sight of. In many respects the instruction should partake of the character of an ordinary object lesson. Before the pupil commences to apply his tools to the material in hand, he should learn something of its nature and properties. The teacher, in a few words introductory

to

to such lesson, should explain to his pupils the distinguishing characteristics of different kinds of wood, as met with in the shop, and as found in nature, and also the differences in the structure and properties of wood, according to its sections, treatment, &c. ; and he should illustrate his lessons by reference to specimens and examples, a collection of which should be found in every school-workshop. Something should be said of the countries from which timber is imported, and the conditions under which it is bought and sold, and in this way the material to be manipulated should be made the centre of a series of scientific object-lessons."

"Concurrently with the practice in the use of any tool the pupil should learn its construction, the reason of its shape, and the history of its development from other similar forms. The saw, the plane, the chisel, and the calipers should each be made the subject of an object-lesson to the pupils. In the same way the teacher should explain the purposes of the different parts of constructive work, and should have models of tenon, mortice, dove-tailing, and other joints to illustrate his explanations. Fifteen or twenty minutes thus spent might be made the means of stimulating the intelligence and of exercising the observing and reasoning faculties of the children, and of enabling them to fully understand the work they are doing, and the instruments they are using."

"Further, the children should be taught from the very first to work from correct scale drawings made by themselves from their own rough sketches. However simple the object may be which the pupil is to construct, it should exactly correspond with his own drawings. In this way the workshop instruction supplements and gives a meaning to the drawing lesson, and the school-teaching is made to have a direct bearing upon the subsequent work of the artisan."

These are the matured opinions of the best English authority. The Parisian authorities have always been in advance, and have now made workshop instruction a part of the regular school curriculum. Of course this cannot be done all at once, as the change requires a rearrangement of school hours, and both workshops and workshop fittings. The additional expense has, however, been voted, and instructions given to carry out the arrangements as soon as possible.

The English Commissioners recommended that proficiency in the use of tools for working in wood and iron be paid for as a specific subject ; and that with regard to Ireland, that systematic instruction be given to primary school teachers, qualifying them to teach the use of tools for working in wood and iron, in the primary schools. The experiments already made in England of introducing workshop practice into primary schools have been very encouraging. In Birmingham and Sheffield, Manchester and Glasgow, the results have been very satisfactory. In London the experiments have been limited. The red-tape of the old system at present blocks the way, and I believe I may state that up to the present time little has been done, but the School Board of London is determined to extend the system to a number of schools under its control. In the Beethoven State schools the experiment was made on a small scale, and Mr. Tate, the headmaster, reports to the Board as follows :—

"This class was started on September 28th, 1885, in a shed or workshop built by the Board in a recess of the playground, and the instruction is given by the school-keeper, a carpenter by trade, under the direct supervision of the headmaster.

"The

"The boys are chosen mainly from the seventh standard, and attendance at the workshop is considered a privilege and a reward of merit in ordinary school subjects. It is therefore a stimulus and an incentive to industry and thoroughness of work. This plan has been so effective that a boy once chosen values the teaching and practice so much that he continues to be chosen each week, and the instruction is therefore continuous, for the class has been virtually the same since it started."

"Boys who have been trained in a good school, and have acquired soundly the rudiments of education, too often, when they leave school, think that their proper career is a city counting-house, and that to wear black clothes and appear like a gentleman is a fair summit of their ambition. I certainly think that this workshop for the upper standard boys will help to dissipate this idea, as it will show boys that, after we have given them the best education which the school offers, we then lead them into the workshop, and so practically show them that the end and aim of our training is to enable them to learn some useful trade, and so become good workmen."

"The workshop, I believe, is a valuable training to enable the eye and hand to work in harmony. It is intended to make the school drawing, especially the scale drawing and geometry, apply as much as possible to the work done in the workshop. It is certainly a pleasant relief to ordinary school work. Should a boy not follow a trade when he leaves school, he will at least be able to make his home comfortable, by using the skill and facility which he has acquired in this workshop."

That manual training, even when occupying a large proportion of the child's time, does not interfere to the detriment of the usual subjects taught in the primary schools is evidenced by the fact that in the half-time schools in the manufacturing districts in England the children make as much progress as where they spend the whole day at school. Mr. Swire Smith, one of the Royal Commissioners on technical instruction, states "that the half-time children of the town of Keighley, numbering from 1,500 to 2,000, although they receive less than fourteen hours of instruction per week, and are required to attend the factory for twenty-eight hours per week in addition, yet obtain at the examinations a higher percentage of passes than the average of children throughout the whole country receiving double the amount of schooling." This gives a most complete denial to those who state that the children have not sufficient time to learn the subjects already on the school programme. So far as experience has gone it has been absolutely proved that the combination of practical work with literary studies has worked well together; and further, that the one has helped the other, so that a greater progress has been made in literary work after the introduction of the practical.

It is of the greatest importance that the manual work should be accompanied by scientific teaching and drawing. When left to the hands of an untrained teacher, such as an ordinary craftsman is nearly sure to be, the results have never been so good as where the manual training was taught by the schoolmaster himself. Where this is not practicable, it should invariably be done under the master's supervision, so that he may supplement it with the necessary science. The great desideratum is of course to educate the teacher, and to make manual training a subject of study at the normal school. The City and Guilds of London Institute are now trying the experiment of educating the school-teachers of elementary schools in a manner somewhat conformable to the Swedish system already mentioned. There it was one of the principles of the system that the instruction should be given by the trained teacher of the school, and there can be little doubt but that this lead will be followed by

by all European nations, and America as well. There should be very little, if any, more cost to the country to make the practical teaching of handwork a subject in the primary school. Manual instruction teaches the uses of the hand and eye, as well as a knowledge of materials ; it is a sensible sort of education, producing better workmen, and consequently making better citizens. As a powerful means of culture it teaches boys to reason much more forcibly than the study of history or geography, and that is the principal reason why the practical teaching should be in the hands of a trained teacher rather than in those of a carpenter who may be incomparably a better workman.

That the question of technical education is considered a vital one by every European country, and reorganization and reform in the methods of tuition are being everywhere made, M. Lockray, the late French Minister for Commerce, under which department all the schools of an industrial character are placed, is contemplating, not only the giving every child a manual training, but a general organization of industrial museums and commercial museums, besides extending the range of industrial schools throughout the whole of France.

Only last December the London Chamber of Commerce passed a resolution that a representative committee should be appointed to consider a well devised scheme for improving Technical Education, and in February last the Associated Chambers carried a similar motion by an unanimous vote. Constant discussion will soon discover what is wanted, and we must be cautious to avoid the errors that others have fallen into ; the fact, however, remains that every European Government recognizes the moral necessity of providing technical instruction for the youth of its country.

As one result of my inquiry I am convinced that it is by the primary public schools that a commencement should be made in the way of technical education. I do not think our elementary schools have, up to this time, produced the results which we have a right to expect. That children learn to read, write, and cipher more or less correctly is a fact, but this is not all that should be learned by the expenditure of such a comparatively large sum as we annually expend upon elementary education. There can be no doubt that for a very large proportion of our school children the teaching required generally is reading, writing, and arithmetic, supplemented with a certain amount of manual training and drawing. This would enable them to become excellent labourers, able to turn their hands to anything, and the evening classes would give the secondary education necessary to such as are intended for artisans and factory hands, while the superior public schools would give the necessary instruction to those intended to enter merchants' offices or the learned professions ; and here again the technical college classes carry the student further forward, until he is ready to pass a matriculation examination for the University. To lose the years from six to twelve before any instruction is given to the hands is to place many children in a worse position than they would have been if permitted to remain with their artisan parents, and had to pick up their book-learning without the compulsion of attending school. In working from childhood they could not fail to acquire a large amount of manual dexterity which could not have been obtained under the present system, and which would stand them in good stead when seriously occupied in learning a handicraft trade.

It must not, however, be understood that I am opposed to compulsory education ; on the contrary, I am an earnest advocate of the system, but I do not wish



to see it take altogether the form it does at present. The great object of education is to fit children for the business of life, and consequently it is only reasonable that they should not be wholly trained as if the entire masses had to get their living by office work. In a thriving community clerks and professional men are proportionally a small number when compared with those who have to get their living as farmers, tradesmen, miners, mechanics of all classes, engine-drivers, and factory hands; and it is to prepare them for these occupations, by which they may earn a comfortable living, that primary instruction should be partly directed. A plan of studies should therefore be arranged, and practical measures taken that this desideratum should be accomplished.

Manual work I have already stated has been introduced into primary schools with great results by several countries, but perhaps Sweden is at the present moment further advanced in this movement than any other nation. This has been brought about in a very simple manner, and chiefly by the energy and munificence of Herr August Abrahamson who conceived the idea of founding and maintaining a normal school for the training of teachers for handwork instruction.

#### AGRICULTURE.

Assistance to instruction in agriculture is given by the English Government through the Science and Art Department. This is done in two ways. The higher instruction is aided by the delivery or courses of lectures at the Normal School of Science, and the partial endowment of a Chair of Agriculture in the University of Edinburgh. The lower instruction in the principles of agriculture is encouraged by the payment of fees to teachers in elementary schools and science classes.

As to the first means that were adopted, the lectureship was not established until last year; the first course of lectures was delivered in 1883.

The fee for a course of forty lectures is £4, and for instruction in the laboratory, £10. The complete course for agricultural students at South Kensington is designed to extend over four years in the following manner:—

First year.—First term, chemistry (Part I.); second term, mechanics and mechanical drawing (Part I.); mathematics and freehand drawing throughout both terms.

Second year.—First term, physics (Part I.); elements of astronomy; second term, geology (Part I.), including mineralogy; instruction in mathematics, and, so far as may be necessary, in geometrical and mechanical drawing throughout both terms.

Third year.—First term, biology (Parts I. and III.); second term, biology (Part III.), and (Part IV., botany); mechanics.

Fourth year.—Principles of agriculture; agricultural chemistry.

An amended curriculum recommended by Mr. Jenkins is as follows:—

#### First Year.

##### *Winter Session.*

Mechanics.  
General Chemistry.  
Elementary Mineralogy and  
Petrology.  
Zoology.

##### *Summer Session.*

Geology.  
General Chemistry.  
Botany.  
Comparative Anatomy.

Second

## Second Year.

Applied Mechanics.  
Agricultural Chemistry.  
Physics and Meteorology.  
Physiology.  
Land Surveying.

Agricultural Mechanics.  
Agricultural Chemistry.  
Economic Botany.  
Zootechny.  
General Agriculture.

## Third Year.

General Comparative Agriculture.  
Farm Management in Winter.  
Elements of Agricultural Law.  
Book-keeping.  
Practical Agricultural Chemistry.

Agricultural Engineering.  
Farm Management in Summer.  
Economic Entomology.  
Common Diseases of Domesticated  
Animals.  
Agricultural Technology.

"During the summer at least one day in each week, and during the winter at least one day in each month, ought to be devoted to visiting the experimental farms at Rothamsted and Woburn, selected farms in the neighbourhood of London, agricultural implement works, artificial manure works, and other establishments where the pupils could be brought in contact with the facts and phenomena with regard to which they have received instruction. I would recommend examinations on the subjects of instruction, at the end of each term, and the award of special prizes for distinguished proficiency."

"The instruction in every subject should be as practical as possible; in other words, there should be demonstration in addition to lectures. Therefore, although four or five subjects a week may not seem a great strain upon the mind of well educated students, I maintain that if the subjects are taught practically as well as theoretically, the subjects given will be found sufficient to employ profitably their time and thoughts. Almost every subject included in the curriculum which I have suggested is capable of practical exercise in the laboratory, or in the workshop, or on the farm, or in the factory. I would even go so far as to urge that in the third year the students should be encouraged to supplement the knowledge which they would derive from lectures upon the elements of agricultural law (such as compensation for unexhausted improvements, dilapidation, trespass, fences, &c., &c.) by hearing cases argued in the Courts of Justice, when opportunities arise."

"The encouragement given under the second head requires a little explanation, and without having regard to the past, perhaps I may be allowed to base my remarks on the "Minute of March 6th, 1882, establishing a new code of regulations," which will shortly come into operation. In this minute, amongst the class subjects enumerated in Schedule 2, is the following:—"3. Elementary science—a progressive course of simple lessons on some of the following topics, adapted to cultivate habits of exact observation, statement, and reasoning." Under Standards I to III this subject is thus defined—"Common objects, such as familiar animals, plants, and substances employed in ordinary life." Under Standard IV is required "a more advanced knowledge of special groups of common objects, such as (a) animals or plants, with particular reference to agriculture." Under Standard V is given (b) "the chemical and physical principles involved in one of the chief industries of England, among which agriculture may be reckoned." Then under Standards VI and VII we merely find as an instruction "the preceding, in fuller detail."

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"It should be explained that "class subjects" come under a different schedule from "elementary subjects," and that the teachers may earn a grant of 1s. to 2s. per scholar for each class subject taught, according to whether the report of the inspector is "fair" or "good." I may also record my opinion that the object-teaching contemplated under Standards I to IV seems to me admirably designed for the instruction of children in rural districts, in those matters which will most nearly affect their future life, and it is only to be regretted that these so-called "class subjects" are optional. It would, indeed, be interesting to learn to what extent the agricultural division of Class Subject III (elementary science) is taught to children who are in the first to the fourth standards in rural schools."

"The department guards against the possibility of class subjects (for instruction in which, as just stated, small grants may be earned) being taught to such an extent as to interfere with the due instruction of the children in the elementary (*i.e.*, compulsory) subjects. Thus, "no more than two class subjects, one of which must always be English, may be taken by either division." Again, "if two class subjects are taken, the second must be, in the lower division, either geography or elementary science, in the upper division geography, elementary science, or history." In all probability geography is the subject most generally chosen, and indeed I have often been told that this is the case."

"More advanced than the class subjects are the so-called specific subjects, which are open only to pupils who have passed the Fourth Standard. Under the head of "principles of agriculture" these are stated as follows:—

First Stage.—The principles influencing the supply of plant food in the soil, the necessity for cultivation, and the circumstances making tillage more or less effective.

Second Stage.—The principles regulating the more or less perfect supply of plant food; manures as supplemental sources of plant food.

Third Stage.—The principles regulating the growth of crops, and the variations in their yield and quality. \* \* \* \* \*

#### REGULATIONS AS TO SPECIFIC SUBJECTS TAUGHT IN ELEMENTARY SCHOOLS.

"A grant on the examination of individual scholars in specific subjects amounting to 4s. for each scholar passing in any subject.

N.B.—This grant is not calculated on the average attendance.

"(I.) The specific subjects which may be taken are those enumerated in the Fourth Schedule.

"(II.) No scholar may be presented for examination in more than two specific subjects.

"(III.) No scholar may be presented for examination in any specific subject for the teaching of which provision is not made in the timetable of the school.

"(IV.) No scholar may be presented for examination in any specific subject who is not also presented for examination in elementary subjects in Standard V, VI, or VII.

"(V.) No scholar may be presented for examination in any specific subject in which he has been examined within the preceding school year by the Department of Science and Art.

"(VI.)

- “(VI.) The examinations in specific subjects follow the stages set forth in the 4th schedule. As a rule, no scholar, after being examined in one subject, may change it for another before passing in all the stages of the first.
- “(VII.) Every scholar should be presented in a stage higher than the highest in which he has before been presented, whether in his present or in any former school. All exceptions should be specially notified and explained in writing to the inspector.
- “(VIII.) No scholars may be presented for examination in specific subjects in any school in which, at the last preceding inspection, the percentage of passes in the elementary subjects was less than 70.”

Mr. Jenkins says:—“The teaching of this ‘specific subject’ is by no means confined to elementary schools in the ordinary sense of the term; but classes for instruction in the ‘principles of agriculture’ have been formed in different localities throughout the country, where a local committee (under the department for the Establishment of Science Classes), a qualified teacher, and a sufficient number of pupils to justify the venture, could be found. I propose to give a history of this institution, which has been drawn up for me by Professor Tanner; but first of all it will be desirable to give some of the regulations of the department, especially as the teachers generally depend for their remuneration to a great extent upon the Government grant.”

One of the first necessities as regards the industrial regeneration of Ireland is no doubt technical teaching in the matter of agriculture; and a plan has been set in operation for teachers of the National Schools to qualify themselves for the teaching of agriculture and the simpler forms of agricultural handicraft to their pupils. Although not much has been done up to the present time, under certain conditions the scheme is capable of affording excellent results.

As to agriculture, the Commissioners of National Education have established at Glasnevin, near Dublin, an elaborate national training institution, where the science and practice of agriculture are taught to farmers, school teachers, and others; and where the most improved systems of dairying are taught to young women, daughters of the agricultural classes. The Glasnevin farm extends over 180 acres, and is arranged to illustrate the various methods suitable for large and small holdings, or for gardens and indoor horticultural pursuits.

Mr. Dennis says:—“The system by which agricultural knowledge is disseminated from the Glasnevin centre resembles that of other training colleges, except that Glasnevin is a combination of a training college and a public school. The students are divided into five classes; free resident students, paying resident students, paying non-resident students, dairy pupils, and National school-teachers. The free places are open to all well-conducted young men, and are filled up by competitive examinations. The paying students are generally the sons of well-to-do farmers, or young men who intend to go into farming either at home or in the colonies. The value of such an institution to these classes is self evident; and with that remark we pass them by, in order to come at once to the teachers, for it is through their agency that the seed grown at Glasnevin is to be taken into every parish and hamlet in Ireland.

“Male National teachers, having farms or gardens attached to their schools, or who may expect to be able to get land for a small farm or a garden, are selected for a course of instruction extending over six weeks. They are boarded, lodged, and taught at the public expense during that time. Moreover; their travelling expenses are

are paid, so that there is every inducement to lead the teachers to take advantage of the institution. It should be added that, having acquired his certificate, the teacher who instructs his scholars in agriculture is entitled to a special result-fee, the amount of which is now 4s. and 5s. per head (according to class) : considerable more than is paid for any other ordinary subject. These are the inducements offered to the teachers. A further stimulus is provided by the fact that in all schools, except in large towns, agriculture is obligatory for boys of the fourth or higher classes ; but the obligation is only as regards theoretical or book agriculture, whereas the Glasnevin system aims at the teaching of practical farming according to the methods most suitable to local circumstances."

Mr. Carroll the able Director of Glasnevin says in his latest report, dated July, 1886, that,—“The sessions for teachers of the National schools were fairly well filled during the year. \* \* \* It is gratifying that the teachers appreciate the courses provided by the Commissioners ; and it is to be hoped that, on returning to their schools, the subject of agriculture will be taught by them in a manner more intelligent than if they had not entered the special agricultural course. Fifty-nine teachers attended during the three sessions, May 1st to October.’ \* \* \* Whilst some teachers have within the past few years improved their systems of management, others are in a condition which I do not consider satisfactory. \* \* \* I should like to see further encouragement given to them either by increased result-fees or premiums for superior management. If we return to the reports of the inspectors of schools, we read the same story. “The proficiency in agriculture is poor. This subject appears uninteresting to the children and unpopular with the parents.’ ‘This branch is avoided whenever possible, except in a few cases, being a favourite with neither teachers nor pupils.’ ‘Pupils in this branch are pretty generally presented for examination, but except in a very few the answering is disappointing.’ ‘Only few pupils are well or fairly acquainted with this subject.’ In a few schools, decidedly good ; in most, poor.’ ‘The teaching is not practical, and is therefore of little use.’”

Remarking upon this, a popular writer says :—“Fifty-nine teachers out of more than 6,000 ! At that rate it will take a hundred years to qualify the schoolmasters of Ireland to teach their scholars agriculture. The miserable inadequate scale on which the work is now being done comes out in another way, if we take the number of existing agricultural schools—that is, schools with land attached and having a competent teacher. The number is 64 out of a total of 7,768 schools under the Board of National Education. Donegal, Tyrone, and Mayo head the list with six each ; in Monaghan, Fermanagh, Limerick, Carlow, Meath, Westmeath, and Leitrim there is only one.’ The area of the farm varies from a single acre up to thirty ; but, in the cases where the farm is of considerable size, we often find that the village pedagogue is also a farmer on his own account.”

“In the dairy branch there is a much larger measure of successful achievement. ‘Most encouraging,’ is Mr. Carroll’s verdict upon it. ‘Young women who have had little or no experience of improved dairy systems previous to their entering the dairy school are now in positions doing good work.’ A similar report is made upon the Munster Dairy School, near Cork. Hitherto, however, no teachers have been passed through the course of dairy instruction ; and it is to be hoped that a way will be found of remedying this defect, especially as good results have arisen from the encouragement given by the board to dairy instruction in schools where the means exist for teaching this branch of industrial knowledge.” The

The objects and scope of the Albert National Agricultural Training Institution, at Glasnevin, near Dublin, can best be described by the following extracts from the prospectus :—

“This institution is designed to supply instruction in the science and practice of agriculture to the sons of farmers, agricultural teachers, and others. (The farm and gardens together contain about 180 statute acres.)

An area of 6 a. 0 r. 17 p. (statute) is cultivated as a small spade-labour farm, with the view of exhibiting a proper system of cultivating the vast number of small farms in Ireland.

An area of 22 a. 3 r. 7 p. has been set apart with a view of illustrating a system of farm management adapted to the circumstances of farmers whose holdings are large enough to give employment to one or two horses.

The remaining portion of the land forms the large farm. The arrangement for affording to the students as large an amount of information as possible upon every branch of the business of farming, including dairy husbandry, the fattening of cattle, the breeding and rearing of different kinds of live stock, the various operations of field and culture, and the permanent improvement of the soil are such as to place within their reach an opportunity of becoming acquainted with the details of practical agriculture.

In order that the students should have an opportunity of acquiring a knowledge of horticultural pursuits, about 3 statute acres are set apart and cultivated as a kitchen garden. There are also a small conservatory, peach house, vinery, fruit and flower gardens, &c.

The course of instruction imparted by the literary teacher embraces all and branches which constitute a sound English education, namely, English grammar, composition, arithmetic, book-keeping, and mathematics, natural philosophy, as also instruction in land surveying, levelling, and mapping.

Each of the lecturers of the institution delivers a course of lectures every session. These lectures are illustrated by means of diagrams, collections of minerals, plants, &c., and chemical apparatus.

In order that students may become acquainted with improved practical husbandry, they are called upon to take part, for a limited time, in the performance of every farm operation—the feeding and management of live stock, &c. They are also made practically acquainted with the uses of a large collection of improved farm implements and machines.

There are two terms or sessions of four months each in the year.

Three classes of students are admitted into the institution :—

1. Free resident students, who are boarded, lodged, and educated at the public expense, and who are admitted twice a year by competitive examination. These competitive examinations take place in July and December.

Some respectable person must certify (1) that the candidate's age is not under 17 years; (2) that he possesses the necessary health and physical capacity for farming; and (3) that he is of good moral character, and possesses the required literary attainments, industrial habits, and tastes.

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The young men nominated for competition are required to attend an examination in the subjects specified in the programme held in their respective districts on some fixed day prior to the opening of each session. A number of the best answerers is chosen, and submitted to a second competitive examination at Glasnevin.

Travelling expenses of students admitted to the institution will not be paid.

2. Paying resident students, a limited number of whom are admitted on the following conditions :—They must possess sufficient literary acquirements to enable them to profit by the lectures of the various professors. Accordingly candidates will be required to pass a fair examination in the following subjects :—

To read and spell with tolerable correctness the words of an easy lesson and explain the meaning ; *to know the parts of speech*, and write every sentence from dictation ; to write on paper a fair hand ; to know the first four rules of arithmetic, and work easy sums in them ; to know the general outlines of the map of the world, Europe, and Ireland.

Each candidate must submit, for the information of the Commissioners of National Education, an application paper duly signed by some respectable person who has known him, setting forth his age, which must not be under 16 years, and full particulars as to the school or schools where he received his previous education.

The fee for each session is £7 10s.

This payment includes cost of instruction, board, lodging, washing, and medical attendance.

A student whose conduct shall be satisfactory may enter upon a second term, and each additional session as may be necessary for his training.

The Commissioners will not admit any candidate who may have been expelled from school or college for bad conduct.

Any paying student who shall leave of his own free will before the expiration of the session, or who shall be removed for misconduct, shall be liable to forfeit the fee for the remainder of that session.

Paying students must conform to all the regulations for the discipline of the establishment. They must take part in all the farm operations with the free students, they take their meals at the same table as the free students, sleep in the same dormitories, and receive the same treatment in all respects.

The paying students whose conduct is satisfactory will be allowed to compete each half-year among themselves for a limited number of free places, one free place being reserved for every *five* paying students.

Students of the above classes (free and paying students) are required to provide themselves, on entering the institution, with two suits of clothes (a strong working suit and a Sunday suit), four towels, two night-shirts, a pair of slippers, a hair brush and comb, tooth brush, and other necessary articles.

Candidates seeking admission to the institution must either have had small-pox, or must have been successfully vaccinated.

Each student, on entering the institution, will require to lodge £2 for necessary repairs to clothing, &c. ; any portion of this money not expended will be refunded to him on leaving the institution.

3. Young men who board and lodge at their own expense in the neighbourhood are permitted to partake of the advantages of the institution on the following terms :—

1. That while at the institution they shall be treated in every way like the resident class.

2. That they attend punctually, with the interim students, all the lectures delivered in the institution.

3. That they be amenable to the rules and regulations.

4. That each pay in advance a fee of £2 a session.

No specified time is set apart for training students of this class.

Each student who deserves it receives a certificate, bearing testimony to his general conduct, proficiency in agriculture, and other studies.

The School of Agriculture at Grignon had for its object the giving of agricultural instruction to young men who are the sons of proprietors, farmers, and others, and like those of Montpellier and Grand Jouan, is maintained entirely at the cost of the State. I visited this school, and obtained from the director, M. Dubost, the information with reference to the methods employed. It is adapted to the education of those who are destined to devote themselves to the cultivation of the soil. At the expiration of their studies a diploma is delivered by the Minister of Agriculture to those students who have passed satisfactorily their final examinations. This diploma is held in high esteem in the agricultural world, and constitutes a powerful recommendation in the eyes of proprietors who wish to choose a tenant or farm manager. Old students who have obtained it, thus find themselves in a far better position to obtain situations than those candidates who have not passed through the school, or who having been students, have not worked hard enough to earn their diploma.

The young men learn at Grignon—both theoretically and practically—all the most perfect methods of cultivation; they are also initiated in the progress of the agricultural sciences. By the examples which they eventually carry into their own neighbourhoods, by the constant and judicious application of the best methods of cultivation, and by the good choice and management of their cattle, they exercise the most favourable influence on the progress of farming in the several districts in which they establish themselves.

The progress of agriculture in France has been enormous during the last 40 years, but it is difficult to assign the exact amount of the total sum which is due to the old students of the schools of agriculture. The principal cause of this progress is the extension of outlets for the produce of the soil, owing to the development of railways; but the pupils of the schools of agriculture being more instructed than other farmers, have both favoured this movement and have profited by it.

Agricultural education, in fact, has not yet borne all its fruit, because up to the present time it has been the possession of only a small number of farmers. Still, it has already popularized many useful methods, and corrected a large number of false ideas. But the services which it will render in the future will be much more considerable than those which it has rendered in the past.



It is impossible for me, in this inquiry, to enter fully into the vast subject of agricultural schools and colleges; but I have appended some useful information with reference to teachers and pupils at the high agricultural institutions in Germany,—the regulations for the final examination of ordinary pupils of the Agricultural High School in Berlin; the instructions issued to the directors of the winter schools established in the Rhine Provinces, together with their rules. With reference to French agriculture, I have appended the official explanation of the law relating to the organization and management of practical schools of agriculture and farm schools, and also the law relative to the departmental and commercial instruction in France.

#### BUILDINGS.

According to modern practice, schools designed for polytechnical studies must be constructed to meet their particular requirements; the lecture theatres, classrooms, laboratories, and workshops need to be of a convenient and particular description. Unless this be arranged so that the student can carry out his experiments under the eye of the teacher or his assistant, the practical applications of science cannot be satisfactorily taught. The class of studies are now so different to what they were half a century since: electrical engineering, for example, necessitates entirely a different class of instruction and accessories to the ordinary study of electricity in the physical classes at the time I have mentioned. Then a simple attendance at lectures would convey the needed instruction, but now the students, besides attending the lectures of the professors, are required to devote considerable time to laboratory experiments and investigations. Then, again, all the instruments and apparatus must be thoroughly understood by the student; and when one considers the variety of machinery employed in the manufacture of electricity, its distribution, its use in the conveyance of telegraphic signals, in the conveyance of sound, and its almost innumerable applications to *so many of our every day requirements—these applications and uses, augmented by almost daily inventions, whereby this mighty agent is made more useful to mankind—it is easy to comprehend the necessity that the laboratories and workshops, wherein the science and application are taught, must be of that character and of such peculiar construction which modern professors have found convenient.* The same reasoning may be used as to the classrooms, &c., for chemistry, pure and applied, mechanics and mechanical engineering, as well as for art teaching in all its branches.

This necessity being admitted it was necessary to gain information upon the subject, and to obtain information as to what had already been done. I have therefore taken the best example, according to the best authorities, from each country that has made the greatest advance in technical instruction, and provided plans of buildings of the most modern character and the most recent construction.

In England I have obtained, through the kindness of Sir Philip Magnus, plans of the Central Institute of the City and London Guilds. In Germany I have the plans of the Berlin *Kunstgewerbe Schule* and Museum; in France the plans of a new school now being constructed at Lille, and in Belgium the new school at Liege.

The new buildings at Chemnitz devoted to technical education, called the Royal Technical Institution, were completed in October, 1877, and are situated on Schiller Platz, not far from the railway station, the finest and most suitable site in the town. They comprise two massive buildings, each four stories high; the main one, fronting the Schiller Platz, with two wings running from it to the back on each side, contains the General School, with the Royal Foremen's and Buildings' Schools.

**Schools.** The laboratory at the back, also a four-storied building, runs parallel to the main one, and contains the Chemical Technological School. Together they form a square, the middle of which is a large open court, laid out in grass plots and garden beds, and in the centre is the main chimney with its boiler-house, communicating underground with the steam heating and ventilation shafts, &c., of both buildings and wings. The plans and detailed description, in which will be seen the arrangement of class-rooms, laboratories, lecture theatres, &c., are to be found in Mr. Felkin's pamphlet.

The cost of these buildings was £81,943, as follows:—Land, £14,700; main building, £42,521; laboratory, £20,019; chimney and boilers, £4,703. They contain eighty rooms in the main building and fifty in the laboratory, with a total of 8,890 square metres, or about 95,690 feet of floor space, besides passages, corridors, staircases, &c., &c. Water is laid on in every room, and the corridors, as well as the rooms, are all heated by steam, and ventilated by the Sulzer Brothers' system. The class-rooms are all arranged for the light to come in from the left. Each school has a special room, containing its own sets of machines, models of machines, and parts of them, collections of appliances, materials, &c., both for the mechanical and the architectural divisions, and these form the nucleus of a museum of mechanical and building appliances. There are suites of rooms for the director and teachers, and a valuable library of technical works. On the upper story is the grand lecture hall, which is only used on special occasions. These buildings contain the following schools, comprised under the name of the "State Technical Educational Institutions," and are (1) the Higher Technical School; (2) the Royal Building School; (3) the Royal Foremen School; and (4) the Royal Drawing School.

The objects of each school is different, the Higher Technical School affords through its systematically arranged courses of instruction, combined with experimental work, the means of scientific education to those who intend to devote themselves in practical life to one of the mechanical or chemical industries, or to the profession of architect. The Royal Foremen School has for its object to give to future mechanists, millers, dyers, bleachers, tanners, brewers, soap, sugar, and chemical manufacturers, &c., as well as to such young men who intend to become foremen and managers in weaving and spinning mills, and also in machine-making establishments, the opportunity of obtaining the theoretical knowledge required in their future career. The Royal Building School offers the means of education to those who wish to prepare themselves for any of the building trades. The Royal Drawing School is an evening school for teaching art in all its branches, and is attended by pupils from the mercantile and other schools in the town; the pupils in fact are drawn from all classes. Instruction is given in freehand drawings, drawings from the cast, and living models in machine drawing, in working drawings, and in architectural drawings. The fees are £6 per annum for the Higher Technical, £3 for the Royal Builders and Foremen Schools while the fees for the Royal Drawing are merely nominal. The Industrial School of Ghent is a somewhat complex institution, which had to deal with several categories of pupils. It comprises elementary and practical courses of arithmetic, mechanics, physics, chemistry, and linear drawing that are specially applicable to workmen of all trades, and the lessons are all given in Flemish, on Sunday mornings and Monday evenings, the only days that the workmen can leave the factory. The programmes of these courses are much lower than those which are given to the pupils during the week.

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Of the other courses, which, as evening classes, are given during the week, and which are all in French, are chiefly for foremen, clerks, and the sons of the patron, &c., that is to say, the young men who, having finished their primary and secondary studies, make use of the time that remains after the work of the day is over to acquire industrial instruction, that is to say, an instruction more practical and more specially applied to industries than the professional sections of universities and colleges.

Besides this general instruction in the sciences and drawing classes, there is a school of weaving, theoretical and practical, established for the purpose of furnishing the numerous factories of Gard and the neighbourhood thoroughly cultivated foremen and directors of weaving factories—foremen knowing from the very foundation all the work of a factory, and able to set up and execute every variety of simple and worked stuffs. The professor in this school gives oral lessons in spinning and weaving, and the pupils each day frequent the workshops attached, where an expert demonstrator exercises them in simple loom work, and in the Jacquard looms. There the pupils weave for themselves all kinds of tissues. The lessons in this section are always given in the day time.

Another department very important for the town of Gard constitutes the school of decorative art, or rather that of art applied to industry, established for the instruction of designers for the various branches of the textile industries, and for decoration in general. Besides these, there are special courses for locomotive firemen, drawing classes for girls, a course for teaching photography, course for practical electricity, and classes for English and German. The course for firemen are followed by the firemen from the great factories of Gard and neighbourhood, the proprietors of which encourage their firemen to attend these classes. To be admitted, a pupil must be 14 years of age at least, must read fluently, and write correctly from dictation in French or Flemish, and know the first four rules of arithmetic applied to whole numbers, and to fractions. To be admitted into the courses of physics or mechanics, and also those of mechanical drawing and construction, the pupil must know the elementary rules of algebra and geometry. In chemistry the pupil must know the first elements of physics. To be admitted to the classes of designers, dyeing and embroidery, the pupil must be able to design ornaments. The conditions of admission to the other special courses, and the conditions of passing a year of study, are determined by a particular rule, which authorizes persons, not inscribed as pupils, to follow certain courses. It is always necessary to have the permission of the Director, or from the Office of administration.

There were over 1,000 pupils at the time of my visit, comprising manufacturers' clerks, mechanical draftsmen, painters, decorators and carvers, teachers, students, and schoolboys, stokers, fitters, and engineers, smiths and locksmiths, iron turners, carpenters, cabinet-makers, &c., soldiers, dyers, and spinners, printers, stone and marble masons, employed in chemical works, various professions, mechanics of no specified trade, female students.

I also visited the Liége school. Here very great attention was devoted to the teaching of mechanical drawing, particularly in its application to the special trades in which the students are engaged. Many of the teachers have been draftsmen in architects' or engineers' offices, and in all cases they were practically acquainted, from personal experience, with the details of the industry, in connection with which the drawing instruction was being given. Special attention is likewise paid to the elements of industrial chemistry, and metallurgy, applied mechanics, building construction, and mathematics.

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The school gives three special diplomas to the first student of the three latter sections.

I found the school accommodated in a very poor and inadequate structure, and the utter insufficiency of the accommodation, which was eloquently complained of in the Report on the condition of Industrial and Professional Education in Belgium, presented to the Legislative Chamber in 1879 by the Minister of the Interior, resulted in the determination of the municipality to erect a commodious building capable of providing for the greatly increased number of applicants desirous of profiting by the special technical instruction. The new building which I visited, and which has since been opened, has been erected at a cost of about £20,000. It contains very large chemical and physical laboratories and lecture rooms; numerous spacious drawing-rooms, for freehand, linear, and architectural and mechanical drawing; a museum for collections for purposes of instruction, a library, rooms for teachers and director, and, in fact may serve in every way as a model building for an evening industrial school. I was so satisfied with the school that I thought it might be serviceable to append drawings of it.

I was so much struck with the excellence of the drawings carried on in the school, especially in the elementary stage of freehand drawing, that I requested the professor, M. Thomas, to furnish me with a statement of the occupations of the students at work on the occasion of my visit. From this information, which has been supplied through the kindness of M. Mayas, the alderman in charge of instruction in the city, the following list has been compiled:—Moulders, strikers, mechanics, fitters, &c., engineers, armourers, telephone fitters, blacksmiths, tinsmiths, wheelwrights, carriage fitters, wood turners, joiners, cabinet-makers, &c., masons, painters and stainers, tracers, modellers, shoemakers, bakers, cigar makers, merchants, shop assistants, farmers, gardeners, soldiers, students, and schoolboys.

The *Institut Industriel du Nord* is housed in a fine new building in the Rue Jeanne-D'Arc at Lille. The director is M. Marquelez. It was founded and is maintained by the Department du Nord and the City of Lille, and it also receives a subvention from the State. It comprises two distinct schools—the Industrial School and the Agricultural School.

The instruction in the Industrial School has for its object the formation of managers and directories of works for the chief industries of the north of France, especially for the sons of persons engaged in industry; that in the Agricultural School is for the purpose of giving the necessary scientific knowledge to the sons of the landed gentry and gentlemen farmers, and includes the so-called agricultural industries, such as the sugar manufacture and distilling. The teaching is both theoretical and practical, and comprises, in addition to lectures and drawing lessons, practical chemical work, mechanical work in the workshops, and visits on an extended scale to industrial establishments.

The institution was founded in 1872, but has since then been accommodated in the new buildings, which are of a very complete and elaborate character, at a cost of £40,000; these include the residence of the directors, the laboratories, of which there are three (one for general chemistry, one for analytical chemistry, and one for industrial chemistry, especially for dyeing), and mechanics' and joiners' shops, which are well furnished with the necessary machinery and materials.

The Industrial School is in two divisions, viz. (a) the technical, in which the teaching is more especially adapted to foremen, and (b) that of civil engineering, the teaching of which is of a higher grade. The course of each division, as well as in the Agricultural School, is for three years.

The

The lower division is again subdivided into three sections :—

- (1.) Mechanical engineering,
- (2.) Textiles,
- (3.) Chemical industry ;

while the so-called civil engineering school is divided into four sub-sections :—

- (1.) Machine construction.
- (2.) Mining and metallurgy.
- (3.) Textiles.
- (4.) Chemical industry.

Diplomas are given to students on examination at the end of their third year, after which they are allowed to assume the title of civil engineer.

The Lille Institute is only a day school, but there is a boarding-house connected with the establishment for thirty-five boarders, each of whom pays £24 per annum. The fees of the institution are £16, and extras amount to about £8. At the time of our visit there were 115 pupils, of whom the larger proportion were engineering students. The total annual income amounted to £3,280, made up as follows :—

					£
Students' fees	...	...	...	...	2,800
Subvention from the Department			...	...	840
"	"	Town	...	...	280
"	"	State	...	...	80
					<hr/> £3,280

For the purpose of teaching the large number of subjects specified on the programme, a numerous staff of professors is requisite. Thus there are twenty-nine professors and ten foremen and other assistants, the sum paid to the teachers amounting to £2,300.

The school is governed by an administrative council, consisting of four of the town councillors, presided over by the mayor. There is also a committee of inspection for regulating the courses of study.

The workshops are supplied with English and other machinery, both for spinning and weaving, which constitute the main industries of the neighbourhood. There is also a good machine shop, fitted with lathes, vices, forges, &c. The laboratories are in active work, several students occupying themselves practically with the chemistry of dyeing. I was much impressed with the system of teaching drawing. In the first year the students work from copies, after which they make measured drawings of parts of machinery. In the second year they take up descriptive geometry, projection and perspective ; also projection of shadows, first of plane figures, and then of curved and moulded figures, with the shadow lines carefully indicated ; then machine drawing, gearing with projection of shadows of wheels and parts of machinery ; then planes and sections of actual work, and of objects they have made in the shop with tinting and shading. In the third year they take gearing and mill work and kinematics. There is a very complete architectural course. The collection of models was very good.

An agricultural farm of about 27 acres is attached to the school, but the number of students in this district is very small, amounting only to eight. There is a well-stocked museum of agricultural products.

The main object of the school is not to form superior workmen or foremen in mechanical shops, as is the case in the Châlons School, but engineers and works' managers,

managers, and the theoretical instruction is therefore of a higher character than in the workman's schools, and less time is devoted to work in the shops than would be necessary to turn out finished workmen. The directors of the school seemed desirous to raise the character of the teaching, so as to attract the same class of students who go to the Ecole Central of Paris, but who require a more practical instruction than the school affords. The opportunities which the school presents for practical chemical work, especially in its application to dyeing, were excellent, but the Commissioners were not equally impressed with the value of the teaching in the textile department, where many of the machines were of an antiquated type, and were apparently little used by students.

On the whole it appears that the school is aiming at too much, and that the lower department is being neglected to some extent with the view of filling the classes for higher instruction. It must be remembered, however, that the establishment is comparatively new, and that the value of its teaching, as well as of its influence on the numerous flourishing industries of the district, may be better estimated in a few years hence.

As indicating the importance which the French Government attaches to technical instruction, it may be well here to mention that in addition to the foregoing institution, it is contemplated to erect in Lille a fourth school of the type existing at Châlons, Aix, and Angeres for the complete education of superior workmen and foremen.

The *Kunstgewerbe Schule* and Museum of Berlin contains school accommodation for 800 students, and is especially arranged with a view to the advancement of the Berlin industries. The school is divided into day and night classes, with forty professors, masters, and teachers, under the able direction of Professor Ewald, who is also the Director of the Art Training School, known as the *Kunstschulen*.

Mr. Pearce—a gold-medallist and travelling student of South Kensington—made a full report together with plans of this excellent institution, at the time of my visit, for the South Kensington authorities. (*See Appendix.*) I give the detailed descriptions and plans, as they are most instructive and full of information.

The Industrial Institute of Lille is scarcely yet completed, but I visited it, and M. Jaquemart, the under secretary of school construction in the Department of Agriculture and Commerce, was good enough to furnish me with working drawings, which can be seen at any time at the offices of the Board of Technical Education.

The Liege Industrial School, of which I also give plans in Appendix, is a magnificent building upon the Boulevard de Saucy, and was opened in 1883. It is arranged in the most modern manner, the space perfectly distributed, well ventilated, lighted, and heated—in short it is built with every improvement.

These examples will serve as types to show your Excellency the class of building, and the distribution of space, now thought necessary by the most advanced and distinguished men who have made a special study of technical instruction.

Progress is the indispensable condition common to all industrial and commercial professions. Science is every day making discoveries that facilitate production, and consequently diminishing its expense, therefore the cost of the article is less than it was before. Producers that remain ignorant of the improved methods, or who prefer to carry on in the old style, are very soon crippled or ruined in the keen competition which must naturally result between themselves and their better instructed rivals.

Art

Art education has diffused a spirit of general improvement and refinement among all the mechanical and manufacturing industries, and this can be seen throughout the length and breadth of Europe. The wealth and prosperity of nations depend upon it in some shape or other. Analyse the value of any article and determine the portion of that value which represents the labour of the artificer. Take a bale of wool worth (say) £15. When manufactured it would probably be worth £1,500. See the value of watch-springs as compared with that of the crude iron. Let me ask what is a country without industries? The increase in the value of the finished article over that of the raw material is obtained by the country which makes the change. A vast quantity of labour is required for this change; it gives employment to thousands and commercial prosperity to the country which furnishes it. Manufacturing industries create towns and cities, intellectual progress in art and science follow in their train. The neighbouring lands rapidly acquire a higher value. A home trade is established and prosperity assured.

### RECOMMENDATIONS.

I have carefully considered what is desirable and practical in regard to the Technical Instruction of the various classes engaged in industrial pursuits in this Colony, and humbly make the following recommendation :—

1. That as no one can possibly doubt the assistance given to Technical Education by the State can be more ably, judicially, and economically applied by a central authority, responsible directly to Parliament, I therefore recommend that a sub-department, under the Department of Education, be created, so that the administration of the vote may be made by the Minister directly responsible to Parliament.
2. That the Minister be assisted by an Advisory Board, consisting of at least three but not more than five individuals, who could be called together periodically to advise with the Minister with regard to school matters, such as the arrangement of the programmes, &c., also to assist him in such decisions as may demand technical experience and knowledge in their consideration.
3. That a Technological museum be at once formed in connection with the Technical College for the use of the teachers and students.  
NOTE.—The present Technological Museum, which, as far as it goes is a very good one, is, from its position and disconnection with the Technical Authorities, altogether dissevered from the object desired to be attained in the establishment of this class of museum. This object being chiefly to provide models of machinery, apparatus, fabrics, products, &c., for the use of technical students and their teachers.
4. That a site be secured for the erection of an institution where Technical Instruction can be given in the approved manner now in use, and with the assistance of modern appliances. That such building include a Technological museum, laboratories, lecture theatres, work-shops, and class-rooms sufficiently extensive for a large metropolitan population, and provide accommodation for at least 3,000 students. That this institution be situated in a position convenient to the industrial classes, who chiefly reside in South Sydney, Balmain, Pyrmont, and around the terminal Railway Station, such a site as would be afforded at Ultimo or in its neighbourhood.  
NOTE.—The rent now paid by the Board of Technical Education for premises in Sydney amounts to over £3,000 a year, which represents a capital sum that would go far to cover the cost of the erection of a grand central institution for the advancement of technical education.

5. That rudimentary drawing be incorporated with writing as a single elementary subject, and that instruction in elementary drawing be continued throughout the standards. That drawings from casts and models be required as part of the work, together with modelling in clay and wax.  
NOTE.—This is the first recommendation of the Royal British Commission, and is practically what I recommended eight years ago.
6. That recognizing the necessity that manual training should be an integral part of any system of general education, inasmuch as it contributes to develop activity, observation, and intuitive perception, I recommend that it be introduced into all the public, primary, or elementary schools as soon as possible.
7. That manual training be taught as an integral subject at the Fort-street Training School, and that in future all the Training School students should be examined in manual training.
8. That in order to provide the necessary instruction for teachers in charge of schools on the subject of manual training, a special course should be instituted at the existing Training school during the vacations, of which the Public School teachers could avail themselves in a manner similar to the method adopted by M. Solomon at Nääs in Sweden. Further, that a normal course of manual training for teachers be instituted in connection with the Technical College, the classes to be held in the evening.
9. That the teaching of art in Training Colleges should be inspected by the Chief Instructor in Art, under the Department of Technical Education, and be made thoroughly efficient, and that arrangements be made for giving to selected students greater facilities for the study of Art and Science at the normal courses of the Technical College. [NOTE.—This recommendation is nearly the same as No. III of the British Royal Commission.]

In conclusion, I may say that I do not altogether close my report, or consider my inquiry finished. I wish to study further the Slöjd, and to obtain further information as to its working during the last year, and as to the elementary agricultural schools in Sweden, Germany, and America. These matters I still hope to carry forward to completion.

I may be permitted to say I am deeply sensible of the incompleteness of this Report; but, in working single-handed and without other assistance, I found it exceedingly difficult to prosecute the inquiry as I should like to have done, and, necessarily, this must be my excuse for its many imperfections.

I also wish to state that I received every assistance from the public authorities of Great Britain, Germany, France, Belgium, Holland, Switzerland, and Italy, and take this opportunity to express my sincere thanks for the prompt manner the officers of the various diplomatic and consular services assisted me in the work your Excellency's predecessor gave me to perform.

I have the honor to be,

Your Excellency's  
Most obedient and humble Servant,

EDWARD COMBES.



## APPENDICES.

Sir,

Offices of the Board, 129 Phillip-street, Sydney, 11 December, 1884.

I do myself the honor to inform you that the following resolution was unanimously passed by the members present at a meeting of the Board of Technical Education on the 10th instant:—

“That as the President (Mr. Edward Combes, C.M.G., M.P.) has intimated his intention to visit Europe, the Government be requested to commission him to make further inquiry with reference to Technical Schools and other matters connected with the systems of technical instruction in operation in Great Britain and on the Continent of Europe.”

I have, &c.,

EDWD. DOWLING,  
Secretary.

Edwin Johnson, Esq., Under Secretary, Department of Public Instruction.

Any expenses incurred to be borne by Mr. Combes.  
B.C., 12/12/84.

The Principal Under Secretary.—E.J.,

### Minute-paper for the Executive Council.

Colonial Secretary's Office, Sydney, 11 December, 1884.

Edward Combes, Esq., C.M.G., to inquire into and report upon the working and constitution of Technological Schools, &c., in Europe and America.

I RECOMMEND the issue of a Commission appointing Edward Combes, Esq., C.M.G., M.P., to inquire into and report upon the working and constitution of Technological Schools, Technological Museums, and other institutions of a like character in Great Britain and the Continents of Europe and America. Any expenses incurred to be defrayed by himself.

WILLM. B. DALLEY.

The Executive Council advise that a Commission be issued to Edward Combes, Esq., C.M.G., in the terms herein set forth.—ALEX. BUDGE, Clerk of the Council. Min. 84-56, 16/12/84. Confirmed, 23/12/84. Approved.—A.L., 16/12/84.

Sir,

Colonial Secretary's Office, Sydney, 19 December, 1884.

I have the honor to transmit to you herewith a Commission that has been issued by His Excellency the Governor, with the advice of the Executive Council, nominating, constituting, and appointing you to inquire into and report upon the working and constitution of Technological Schools, Technological Museums, and other Institutions of a like character in Great Britain and the Continents of Europe and America.

I have, &c.,

W. B. DALLEY.

Edward Combes, Esq., C.M.G., M.L.A., Glanmire.

[Enclosure.]

### COMMISSION.

BY HIS EXCELLENCY THE RIGHT HONORABLE LORD AUGUSTUS WILLIAM FREDERICK SPENCER LOFTUS, Knight Grand Cross of the Most Honorable Order of the Bath, a Member of Her Majesty's Most Honorable Privy Council, Governor and Commander-in-Chief of the Colony of New South Wales and its Dependencies.

To EDWARD COMBES, Esquire, of Glanmire, in our Colony of New South Wales, Companion of the Most Distinguished Order of St. Michael and St. George, a Member of the Legislative Assembly of our said Colony, and President of the Board of Technical Education, and President of the Art Society of the Colony aforesaid,—

Greeting:

Know you, That, reposing great trust and confidence in your zeal, discretion, and integrity, I, LORD AUGUSTUS WILLIAM FREDERICK SPENCER LOFTUS, as Governor of the Colony of New South Wales, with the advice of the Executive Council thereof, do, by these presents, nominate, constitute, and appoint you, the said EDWARD COMBES, to inquire into and report upon the working and constitution of Technological Schools, Technological Museums and other Institutions of a like character, in Great Britain and the Continents of Europe and America.

Given under my hand and the seal of the said Colony of New South Wales, at Government House, Sydney, this sixteenth day of December, in the year of our Lord one thousand eight hundred and eighty-four, and in the forty-eighth year of Her Majesty's Reign.

[L.S.]

AUGUSTUS LOFTUS.

By His Excellency's Command,  
WILLIAM BEDE DALLEY.

Entered on record by me, in Register of Patents, No. 12, page 127, this nineteenth day of December, 1884.

(For the Colonial Secretary and Registrar of Records),

CRITCHETT WALKER,  
Principal Under Secretary.

APPENDIX A.

## APPENDIX A.

## DRAWING IN ELEMENTARY SCHOOLS. (Plates VIII, IX, and X.)

DRAWING has now been introduced under the code of the Education Department into all elementary schools as a class subject.

The system of examination of elementary schools by local inspectors has been extended to the whole of England and Scotland, except to a few schools in remote districts. This extension becomes absolutely necessary with the introduction of the "class subject."

As this is a very considerable innovation, and as the general notion as to what is actually required under the various standards is a very hazy one, the illustrated syllabus issued under the joint authority of the Education and the Science and Art Departments has been here reproduced on a reduced scale, and will be found in the following eight plates:—

Standards 1 and 2 (illustrated in Plate VIII A), consist of drawing in freehand or with the ruler lines, angles, parallels, and the simplest right-lined forms. Children in standard 1 should draw on slates, in standard 2 on paper, drawing the figures freehand first, and afterwards with the ruler. [See Plate VIII A.]

Standard 3 consists of freehand drawing of regular forms and curved figures from the flat (see upper portion of plate VIII B), and of simple geometrical figures to be drawn with rulers and in freehand (see lower part of B). [See Plate VIII B.]

Standard 4 consists of freehand drawing from the flat (see upper portion of plate VIII C), and from simple rectangular and circular models (see lower portion of plate VIII C); also of drawing to scale in a limited manner, and of geometrical figures with instruments. [See Plate VIII C.]

Standard 5 includes—(a) Freehand drawing from the flat objects such as those in the upper part of plate IX D, which should be enlarged or reduced from the example; (b) of model drawing from easy common objects (see centre portion of plate); (c) of plans and elevations of plane figures and rectangular solids in simple positions; (d) of drawing to scale on a rather more difficult basis, such as  $\frac{1}{4}$  inch to the foot. [See Plate IX D.]

Standard 6 is similar to the fifth, but of greater difficulty; the upper portion of plate IX E represents objects for freehand drawing from flat examples, as to which the difficulty should be increased by making larger drawings than in standard 5. The centre portion shows specimens for model drawing, and the lower, plans, elevations, and sections. [See Plate IX E.]

Standard 7 includes—(a) Drawing from any common objects and casts of ornament in light and shade (see plate X F); (b) plans and elevations of circular solids with sections (see plate X G). [See Plate X.]

Children in the first three standards should make their freehand and model drawings of a size to fairly fill slates, or paper, 6 or 7 inches in length. Children in the higher standards should be exercised in enlarging and reducing their freehand examples, and should generally draw on a larger scale than the children in the lower standards.

In the use of instruments children in the first three standards should not be required to do finer work than is involved in making circles of  $\frac{1}{4}$  inch radius.

In the higher standards smaller dimensions may be employed.

N.B.—In order to interest the children it will be advisable to teach them to draw as early as possible from actual objects, such as the doors and windows, furniture and apparatus, of the schoolroom.

## APPENDIX B.

## OPINIONS OF PROFESSOR ADLER, DR. BELFIELD, AND DR. WOODWARD ON TECHNICAL TRAINING.

PROFESSOR Felix Adler's educational enterprise in the city of New York—the Working-man's School and Free Kindergarten—is unique in this, that while it is entirely a work of charity, it is the most comprehensive educational institution in existence, as appears from the following description of its courses of instruction:—

"The Working-man's School and Free Kindergarten form one institution. The children are admitted at the age of 3 to the Kindergarten; they are graduated from it at 6, and enter the Working-man's School; they remain in the school till they are 13 or 14 years of age;—thereafter those who show decided ability receive higher technical instruction. For the others who leave the school proper and are sent to work, a series of evening classes will be opened, in which their industrial and general education will be continued in various directions. This graduate course of the Working-man's School is intended to extend up to the eighteenth or twenty-first year.

"From the third year up to manhood and womanhood, such," says Professor Adler, "is the scope embraced by the purposes of our institution."

DR. BELFIELD says as to the value of the new system of training:—

"The distinctive feature of the Manual Training School is the education of the mind, and of the hand as the agent of the mind. The time of the pupil in school is about equally divided between the study of books and the study of things; between the academic work on the one hand, and the drawing and shop-work on the other. Observe, I do not say between *school-work* and *shop-work*, for the shop is as much a school as is any other part of the establishment. Nor do I mean that the shop gives an education of the hand alone, and the class-room an education of the brain, but I mean that the shop educates *hand and brain*. That the *hand* is educated I need not stop to prove, but the shop educates the mind also.

"Had you been in the wood-working room of this school a few hours ago, what would you have seen? Twenty-four boys at work at lathes driven by a powerful engine. Are any idle? No. Are any inattentive to their work? No; you notice the closest and most earnest attention, frequently approaching abstraction. Here then is the cultivation of a most important faculty of the mind—attention, the power of concentration; and it is worthy of remark that this attention is not an *enforced* attention, but is cheerful, voluntary, and unremitting.

"The

"The young workman is engaged on a problem in wood, just as, a few hours earlier, he was engaged on a problem in algebra. He has before him a drawing made to a scale. The problem is this: He must gain a clear conception of the object represented by the drawing; he must imagine it; he must select or cut a block of wood of the proper dimensions and of the right quality. It must not be too large, for he must guard against waste of material and waste of time. It must be large enough, for there must be no incompleteness about the finished product of his labour. Observe him as the work grows under his hand; observe the selecting of the proper tools for the different parts of the process; observe the careful measuring, the watchful eye upon the position of the chisel, the speed of the lathe, the gradual approach of the once rectangular block to the model which exists in his brain, and you must admit that this work demands and develops, not manual dexterity alone, but attention, observation, imagination, judgment, reasoning.

"My own opinion is that an hour in the shop of a well-conducted manual training school develops as much mental strength as an hour devoted to Virgil or Legendre.

"But of this I am confident, that three years of a manual training school will give at least as much purely intellectual growth as three years of the ordinary high school, because, as has been said, every school hour, whether spent in the class-room, the drawing-room, or in the shop, is an hour devoted to intellectual training. And I am also convinced that the manual training school boy's comprehension of some essential branches of knowledge will be far superior to that of the other boy's, as the realization of the grandeur and beauty of the Alps to the man who has seen their glories is superior to the conception of him who has merely read of them.

"And here is the mistake of those who would degrade a manual training school into a manufacturing establishment. The fact should never be lost sight of for an instant that the product of the school should be, not the polished article of furniture, not the perfect piece of machinery, but the polished, perfect boy. The acquisition of industrial skill should be the means of promoting the general education of the pupil; the education of the hand should be the means of more completely and more efficaciously educating the brain.

"Take two boys, one with little or no education, the other a high school graduate; let them enter the machine shop of a large manufactory, beginning, as boys ignorant of the technique of the trade must begin, at the lowest round of the ladder. It cannot be doubted that in three or four years the high school graduate, if he had been willing to do the drudgery incident to the place, would have reached a higher position than the other boy, and would be in a fair way to succeed to some responsible post in the establishment. But the graduate of the manual training school, by reason of his superior knowledge of machinery and materials, his skill in the use of tools, added to his general mental training, would begin at the point reached by the high school boy after his years of apprenticeship. From the day of his entrance into the factory he would be conspicuous. While the other boys would stand in the presence of the huge Titan of the shop lost in the wonder of ignorance, the manual training boy would gaze with delight on the marvel of mechanism, wrapped in the admiration begotten of a thorough understanding of its construction, and strong in the consciousness of his mastery of it."

DR. WOODWARD says: "With the aid of our staunch friend, Mr. Gottlieb Conzelman, we fitted up during last summer a wood-working shop, with wood-benches and vices, for eighteen students; a second shop, for vice-work upon metals and for machine-work; and a third, with a single outfit of blacksmiths' tools. During the last few months systematic instruction has been given to different classes in all these shops. Special attention has been paid to the use of wood-working hand-tools, to wood-turning, and to filing.

"These tentative steps promoted a healthy public sentiment, and attracted the attention of several wealthy men, who in 1879 contributed the funds for the permanent foundation of the school.

"The ordinance establishing the Manual Training School was adopted by the Board of Directors of the University, June 6th, 1879.

"The lot was purchased and the building begun in August of the same year. In the November following a prospectus of the school was published. In June, 1880, the building, being partially equipped, was opened for public inspection, and a class of boys was examined for admission. On September 6th, 1880, the school began with a single class of about 50 pupils. The whole number enrolled during the year was 67. A public exhibition of drawings and shop-work was given June 16th, 1881.

"The second year of the school opened September 12th, 1881, and closed June 14th, 1882. There were two classes, 61 pupils belonging to the first year, and 46 to the second year, making 107 in all. Of the second year class 42 had attended the school the previous year.

"The third year of the school will open on September 11th, when three classes will be present.

"The large addition now in progress (June, 1882) is to be completed and furnished by the day set for the examination of candidates for admission—September 8th. The number of pupils in the new first year's class is to be limited to 100. Nearly one half of that number have already been received.

"One great object of the school is to foster a higher appreciation of the value and dignity of intelligence of labour, and the worth and respectability of labouring men. A boy who sees nothing in manual labour but mere brute force despises both labour and the labourer. With the acquisition of skill in himself comes the ability and willingness to recognise skill in his fellows. When once he appreciates skill in handicraft he regards the workman with sympathy and respect."

## APPENDIX C.

### COMMERCIAL EDUCATION—SIR BERNHARD SAMUELSON'S PAPER, AND DISCUSSIONS THEREON.

SIR BERNHARD SAMUELSON read a paper on this subject on the 1st April, 1887, before the recent Congress of the Chambers of Commerce, and in the course of it he said:—

In considering the best means of educating our young men for a commercial career, it may, perhaps, be desirable to say one or two words in justification of the question having been proposed, for, it may be contended that inasmuch as Great Britain stands without dispute at the head of the commercial nations of the world, the training received by its young men must have been well adapted to make them successful  
merchants,

merchants, and that consequently all that is required in regard to commercial education is to proceed in future on the same lines as in the past. To this I would reply that the education of a merchant consists of two stages: The first of these is general, the second strictly technical; and I will at once admit in regard to the second stage, namely, the training of the counting-house and warehouse, although it is capable of improvement, that it is, on the whole, in advance of that of any European country. I believe that in our commercial methods—by which I mean all that relates to business organisation—directness, despatch, division of labour, &c.—we are as much in advance of other nations as we are in capital, enterprise, and largeness of view. And if this be so, then a British merchant's office will necessarily be the best school of technical instruction of a British or Colonial merchant. Other countries are resorting to special technical schools, of various ranks, the most ambitious probably being that lately established in Paris by the Chamber of Commerce, in reference to which the representatives of the British Chamber of Paris will probably be able to give some information. There is a commercial school of some celebrity at Antwerp. I visited one at Dresden, but nothing that I have seen or heard of these schools leads me to believe that this can be anything like an efficient substitute for the training and experience which a youth would, other things being equal, obtain in a well-conducted mercantile office.

But other things are not equal, for the German or Swiss youth entering an office at the age (say of 17), has received a general education which enables him to take full advantage of the technical training of the counting-house; and this is very far from being the case of the Englishman. The German or Swiss has been well grounded in commercial geography; he has a general acquaintance with natural science, and more especially with the nature and habitations of plants and animals. He is a correct and rapid arithmetician, having been taught the principles, and not the mere routine, of arithmetic; and, above all, he is able to write with tolerable correctness, if not to speak with fluency, one or more modern languages besides his own. Those who have seen the German or Swiss clerk at work in our seaports, in our great centres of manufacture, and in our colonies, will not hesitate to confirm what I have stated, and will be able to compare his qualifications with those of the young Englishman educated at a public school or at a "classical and commercial academy."

All the great towns of Germany and Switzerland, and most of the smaller ones, contain good secondary day schools, in which for a fee of from £3 to £6 per annum, boys and girls are thoroughly well instructed by thoroughly competent and zealous teachers. These schools are established and supported by the municipalities with, generally speaking, very moderate if any aid from the State, whilst in this country such schools are found only in favoured localities, and the necessity for their establishment appears scarcely as yet to be fully appreciated by the public.

I have said that our commercial supremacy is still undisputed, but those who are best acquainted with our trade and manufactures will not deny that our neighbours are gaining rapidly on us. They well know that in the United States, in our own Colonies, in China and Japan, and in the South American States, Germany and Switzerland are our active, intelligent, and, for the most part, our honorable rivals; that the German and Swiss manufacturers have direct representatives, and in many instances their own branch establishments, conducted by young relatives, in all or most of those countries; that in the yards of our naval architects, and not these only, but also in the ship-yards of the Baltic and elsewhere, and by the aid of the German Imperial Government, mail-steamers have been constructed, and other trading lines are being established; that no stone is left unturned to enable our competitors to obtain a large and increasing share of the commerce of the world; that in regard to financial transactions London is no longer the sole and undisputed market; and that even in this country, and for our own internal commerce, a preference is frequently given to young foreigners who have received their general education in their own respective countries.

I have said that even this training, to be obtained in our counting-houses and warehouses, is capable of some improvement, and I would point more especially to the necessity for greater attention to details, such as a more careful study of the peculiar requirements of foreign markets. I have noticed abroad that in nearly every branch of manufactures these are studied in a way which our manufacturers would do well to imitate.

But that of which we stand most in need is a system of good and cheap modern secondary schools, in which particular attention should be given to proper instruction in geography, arithmetic, the elements of natural science, and modern languages. These schools should be founded and maintained by the localities themselves, and they would soon and amply repay their cost. It cannot, however, be expected that they will be created so long as the whole burden of public local expenditure is borne by realty alone; and this, amongst many other reasons, points to the necessity for such legislation as will distribute local charges equitably over personal and real property. What the details of such legislation should be is beyond the province of discussion on the present occasion, and I shall confine myself to asking some gentleman in the meeting, at which I regret to be unable to be present, to move that:—

"A system of good secondary day schools, founded by the localities in which they are situated, and supported mainly by rates equitably distributed, is necessary for the efficient education of our young men intended for a commercial career."

After reading the paper of the President, Mr. Monk said all, no doubt, would agree that there was no better training for a youth than that of a well-conducted mercantile office. That was the President's first proposal. But in order to qualify a youth to enter an office and to derive the advantage from being in it, he must have a preliminary training, which many at present did not obtain. The University College (Victoria University), Liverpool, seemed to be the kind of institution which Sir Bernard Samuelson desired to see founded and maintained by local funds. Victoria University issued a special curriculum for students preparing for business life. The annual cost would be from £20 to £27. There were two alternative courses, each admitting a considerable latitude in choice of subjects. The curriculum extended over a period of one year and nine months from the date of entering the college, and would, as a rule, be completed when the student was about 18 years of age. In the first year the subjects were:—(1) English Composition, English History, Mathematics, two of the following languages:—French, German, Italian, Latin, Greek; or, as an alternative, (2) English Composition, English History, Mathematics, Physics, Chemistry, one of the following languages:—French, German, Italian, Latin, Greek. For the second year there were also alternative courses, viz., (1) English Composition and Literature, two at least of the following subjects:—History, English Literature, Logic, Political Economy, Mathematics, Chemistry, Physics, two of the languages specified above; or (2) English Composition and Literature, Mathematics

and

and one of the following subjects:—Physics, chemistry, biology, one of the languages specified above. In either alternative the following subjects were compulsory:—English composition, English history, mathematics, and one foreign language. All would agree that there was, in most of the large centres, a want of efficient secondary schools. They were, however, aware that many grammar schools, which formerly taught nothing but Latin and Greek, and excluded modern languages altogether, had been reorganised; and he saw no reason why they should not be reorganised to a still greater extent. The funds, which had been misapplied to a very great extent in providing classical education to the youth in large towns, should have been employed in teaching modern languages. There was one point on which they must hold an absolutely certain opinion, and that was if a young man was to speak fluently French, German, or any other modern language, he must have lived for some time in the country itself. It was very desirable that the subject should be thoroughly considered. Many were present fully competent to give advice, and he hoped that Sir B. Samuelson's, or a similar resolution, would be submitted to the meeting.

Mr. W. T. Rowlett said that a commercial education, all must acknowledge, was of the highest importance at the present time. In his paper, Sir B. Samuelson seemed to leave aside the question of technical education, which was one of the most important matters connected with the question. It was quite true that a young German, or a young Swiss, was exceedingly fluent in two or three modern languages, and he was sorry to say that that was very much the exception with our own countrymen. That was a loss that they knew very well was being remedied, more or less, every day; for a great many of the sons of leading merchants and manufacturers were going abroad to France and Germany, in order to acquire a proficiency in those languages. They also knew very well that the commercial supremacy of Bradford had been created not alone by Englishmen, but largely by foreigners, particularly by Germans, who fostered the trade of the town (1) by their knowledge; (2) by their readiness to correspond with any country in the world. That was the kind of knowledge which secondary education, of the kind already mentioned, would very much obtain for English young men; but, at the same time, the technical education given abroad was one of our lamentable deficiencies. Yorkshire towns were establishing schools for the purpose of such instruction. Leicester had made some advance in the same direction, and as he had been closely connected with that movement, perhaps some information from him might be interesting. The principle local manufactures at Leicester, were hosiery and boots and shoes. Some years ago the Chamber of Commerce appointed a deputation to visit the schools in Bradford, Leeds, and the surrounding towns. From the experience gathered there they tried to establish technical schools for Leicester, affiliating them with the large local grammar school. In want of a text-book they sought in vain for one in English, but found one in German. They had been wondering how it was that the Germans could so completely beat the English out of the market, not alone on account of their lower wages, but also by the thorough understanding they seemed to have of special manufactures. That text-book in German had been translated and published for the Leicester technical schools, so that his English fellow-countrymen were now on a par with Germans in that respect. The promoters of technical education in Bradford had, however, this disadvantage; they found great difficulty in interesting the manufacturers in sufficient numbers to enable them to obtain all the funds they required, and they had consequently to make the best of the limited means at their command. One of the very best ways of furthering technical education was to connect it with Board schools, just as cookery classes were established for the benefit of the wives of the working-classes.

Mr. H. M. Holmes had devoted more than fifty years of his life to the managing and conducting of elementary education, and had witnessed with satisfaction the effects of the old system before the establishment of the Board school system upon the young men, who, with sufficient application and natural talent, had high positions in life. There was a Member of Parliament who had been educated in one of these elementary schools and two men who occupied high positions in connection with the Board of Works. The School Board of Derby shrank from the question of secondary education, as they knew it would be unpalatable to the ratepayers to saddle them with an addition to the school rate, though he believed that if once established the expense would be very slight. Middle class schools soon became self-supporting; there were five or six in Derby and they were very efficient. What they wanted was technical schools. Several of the London City Companies more than twenty years ago directed their attention to this important question, and had done a great deal of good in the same direction for many years past, by grants of money devoted to prizes, certificates, and medals, awarded for proficiency in drawing and designing, and for the best essay bearing upon the several crafts which the companies fostered. Other towns were benefited in the same way. The burdens of the ratepayers might be considerably lightened if aid were obtained from large charities, whose funds were no longer required for their original purpose. The Charities Commissioners, to whom application should be made, now possessed all the powers formerly exercised by the Endowed Schools Commissioners, and they might allow considerable sums to be devoted towards technical and other schools, whereby might be brought out the latent power of the youth of the country.

Mr. T. D. Yates who had had an experience of forty years in connection with the following business, described the advantages afforded by the Yorkshire College in regard to commercial education. All the subjects mentioned in regard to the Liverpool College were taught in the Yorkshire College. There were about a thousand day and evening students, many of them were taught weaving, dyeing, chemistry, and biology, besides many other subjects. When he saw Germans and Frenchmen coming over to this country and taking positions in English houses, which our own young men might occupy if they only had half the training in languages those foreigners possessed, he felt that it was high time to take up the matter seriously, and no longer play into the hands of competitors the strongest and greatest we had. It would be necessary to make more educational progress than we had in the past if we are to keep abreast with foreign nations.

Mr. G. N. Hooper said, that as this was a subject in which he had been interested for many years, he begged the indulgence of the meeting while he spoke upon a question which was of vast importance as affecting the future of English manufactures. First of all, he would refer to a paragraph connected with the subject of education, which appeared in the reply sent by the London Chamber of Commerce to the questions issued by the Royal Commission on Depression of Trade and Industry. In the answer to the inquiry "What measures could be adopted to improve the existing condition of trade independently of legislation?" The London Chamber said, "By a better

better selection and arrangement of school studies and preparation for a commercial and manufacturing career; such selections to extend to primary and secondary schools, and high schools of commerce, such as have been successfully established in France, as well as a more vigorous encouragement of graded technical schools, suitable for apprentices, workmen, foremen, managers, and employers." The resolution was a wide one. He did not think that they would find that technical education applied only to the higher classes of commercial men would answer their purpose. Nor would it answer their purpose applied solely to managers, nor in its utmost benefit to workmen or apprentices. They would find that when a man who had himself received a scientific education had under him an illiterate workman he could not carry out his plans in the way he would be able to do were the workman able to understand the directions given to him. One very great difficulty, as manufacturers would tell them, to the introduction of improvements was the prejudices of workmen. If by technical education they merely removed those prejudices against the introduction of new machinery and new processes they would do a great deal of good. It was said that this question was one affecting manufacturers only, but an advantage would arise both to the merchant and the manufacturer if the manufacturer found it worth his while to introduce improvements which would enable him to sell for 19s. which formerly cost 20s. while the merchant got for 10s. what formerly cost him 20s.; or if a better quality were produced at the same price, the merchant as well as the manufacturer would have a better chance of competing in the markets of the world. The apprehension as to the great cost of establishing technical schools had become a sort of bugbear. But small schools which would cost less than large ones might be carried on at a cost of from £60 to £80 a year each. He had been associated with an effort of that character, and though some amount of opposition had to be faced, the promoters had struggled against it, and a useful work had been accomplished. Technical instruction would be promoted if board and voluntary schools would lend or let their rooms for that purpose to classes for a small charge in the evenings. In Westminster there was an old apprenticeship fund, and leave would shortly be asked to apply it to the payment of fees for technical instruction. At the United Westminster Schools, evening technical classes had been carried on for two winters, and releasing the funds of the unused apprentice charities will provide money that would remove some of the chief difficulties. The evening technical classes should be arranged by a joint committee of employers, managers, and workmen, one of the latter acting as secretary. As the students acquire skill, some may be advanced as assistant teachers, and afterwards to be teachers and lecturers. One of the conditions of the employment of apprentices by his firm was that they should attend the technical classes, the firm paying the fees; and in order to encourage them, prizes, certificates, medals, and books were distributed among the more successful. Limited Liability Companies, established for promoting education, might do a good work in technical instruction, and some were already in active operation in London. He had been in correspondence on this subject with the Rev. H. F. Wall, of the Rainsgate College, from whom he had received the following interesting letter:—"You have struck upon a line of which I have of late thought much, and on which I wished greatly for information. I am fully aware of the great waste of time, energy, and money, as well as of the great loss of intellectual and practical gain to the nation at large, and of the many instances of failure in an educational sense among the youth of this country, from the unmethodical and unpractical systems of education adopted in England. Time, pains, energy, and brains are spent in teaching boys the elements of Latin, Greek, and other things. Of these boys 75 per cent. never make any use of the knowledge—and it is but scanty—thus acquired. Of the remaining 25 per cent. 10 per cent. never attain to more than a very moderate standard of proficiency, and the other fifteen become scholars with a view to University honors and the scholastic profession, and go forth to perpetuate the system which has obtained for some hundred years. Your suggestions are admirable, and I shall be delighted to hear from you at any time. [Mr. Hooper here explained that he had given illustrations of the excellent education provided at the High School of Commerce at Rouen, and also at the technical school at Rheims.] I will write to the London Chamber of Commerce, as well as to Rouen and Rheims; and if you can put me in possession of any more information I shall be very grateful for it." For his own part, he had been astonished at the apathy of English manufacturers on this subject as compared with those of other countries; but the facts he had given would show, at any rate, that the movement of technical education was progressing, and his wish was that the useful schemes already at work might be encouraged, not only by the London Chamber, but by the Associated Chambers of Commerce.

## APPENDIX D.

### MR. M'ARTHUR'S VIEWS ON TECHNICAL TRAINING.

SINCE the industrial revolution which resulted from the steam engine, various contrivances have been constructed under the name of machine tools. Now, while these tools are both heavy and fine work, they can only be employed in large establishments with an extensive plant and a great variety of machinery. The bulk of mechanical work for current wants in many parts of the country, must of necessity, be handwork, as it is divided into so many widely distributed details. Take as an illustration that of house building. The material is all prepared by machinery, yet a large proportion, if not all the construction, is still by hand skill, and of a far higher range of skill than is required for turning a machine; for, while the latter is routine work, the former is a continued presentation of new conditions requiring both judgment and skill. The building consists in simply making into concrete form the conception already illustrated by the drawing. It is one of the first necessities, and in its plainest form, is very simple. The work begins in the forest. Trees are cut down almost entirely by hand tools. The axe in the hands of those skilled in its use is a very effective instrument for many uses. It is a favourite with everybody, from the small boy with his diminutive hatchet, and its need to a great variety of purposes in domestic life cannot be denied. Next comes the use of machinery for sawing the trees into various kinds of lumber, bringing it to straight or curved lines in rough forms. Another labour-saving machine of still more surprising power intervenes: The planing-mill dresses the lumber to a finer finish, and by still other contrivances the boards, posts, beams, floors, windows, doors, and mouldings are sawed, tongued, and fitted to match each other; but before these pieces become a part of the structure, they are subjected to a great number of details to the hand-plane, hand-saw, and other hand-tools, for the purpose of minuter divisions and proportions, as well as for finer finish, ornamental effect, and the best form of configuration. The heavy routine work is performed by steam; but the same skill in arranging the parts, the



the same dexterity in handling tools, and the same skill in finishing the job, are required, for perfect work in architecture is a growing demand in all kinds of buildings; so every part of wood or iron in the construction of carriages and waggon can be obtained all ready made. In new structures this is a great convenience; but to make a carriage a complete thing requires constructive science of the highest order, to say nothing of the painter, the upholsterer, and the worker in leather, who are associated in the finished production. Besides, carriages are constantly requiring repairs, which it would be impossible to provide for, especially in the rural districts, in any other way than by making the individual part needed for the repair of the special want. All this requires first-class hand skill. The same illustrations can be extended to all mechanical trades, for they are general in their application. The useful arts are pre-eminently co-operative. Thus it is true that machinery enlarges the facilities of productive industry, and thereby increases the demand for a higher education in the theories and science of their movements to make our greater facilities available. It is, after all, the hand-work of the artisan required in these operations that gives a distinctive character to the work, and makes it a speaking memorial of his skill and genius. The use of machinery is not art. A machine copies, and can multiply a thousand or a million fold the same article, and it makes them exactly alike; but the skill with which an artisan designs his work, or invents a remedy for an unexpected obstacle, exercises the spirit of true art, and deserves the palm of refinement and originality. He evolves the present power to think and work, and the future strength and courage to create the circumstances necessary to his success. The moment he takes up his work is that in which his mind is busiest, for, by a natural adjustment, all his abilities are concentrated upon the subject in a common focus; and perhaps the thoughts which agitate his mind will find expression in the excellence of his work, or in that which will add to its efficiency or improve its quality. Of course I speak of one who understands the practical bearing of the science upon which his work is based. There is a very general idea that the sciences have no connection with the useful arts of life, or that there is any need of cultivating them for the material uses of art. To educate a mechanic in science appears to many persons as absurd as it would be to give meat to a thirsty man or drink to a hungry one. And yet it is of more importance to teach him that species of knowledge than to do the same thing for a scholar. He is the true demonstrator, for he reduces the theories of the philosopher to practice, and connects them with substantial uses for the benefit of all. The mission of practical science is to minister to industrial art, and, of both combined, to reign over the broad interests of mankind and the work which occupies their life. The British Government, as we have seen, immediately after the first great International Exposition, organised schools in all the commercial and industrial centres throughout the Kingdom for the education of working people in the various branches of science bearing upon their pursuits, with night classes for those who could not attend during the day. In this England but followed the course which had been adopted long before in nearly all the continental countries; and, indeed, in those days she had to import her chemists and other practical men of science from Germany and Switzerland. Within the last few years technological institutions have been in active operation in the United States, and extensive accommodation is now furnished in several of our colleges for instruction in all the applied sciences. But, as has been before remarked, these institutions are within the reach only of a few of the children in the Public schools, and it is therefore a matter of sincere congratulation that arrangements more or less liberal are now made for teaching some of the broad truths of elementary science in the public schools, especially in the high schools, many of which possess philosophical apparatus to illustrate the studies by experiments which lead to practical results. We have every facility in the United States for teaching the whole people the general truths of science. Unlike any other nation, which had to begin at the beginning by organising a national system of education, ours is already in existence, and the education of the body of the people in general knowledge has prepared them in the best manner for mastering a degree of accurate information in one or more of the sciences bearing upon their industry. There are but few pursuits above that of common labour which do not require for their successful prosecution information of this character, for science is now connected with all branches of productive industry. Chemistry is connected with many arts besides agriculture; physics is connected with mechanical industry of every description; and mathematics is the basis of innumerable arts indispensable to civilization. Education in the rudiments of science is a requirement and almost a necessity in present conditions—no great innovation is required—the study has already been ingrafted on the course, and all that is necessary to render this available for technical purposes is laboratory instruction in chemistry, physics, and mechanic art. It is suggested that the laboratory should be attached to the high school, and should consist of two branches, one for scientific apparatus and experiment, and the other for machinery, tools, and workshop practice; and that in both the teaching should be by classes, and the students be required to perform experiments when sufficiently advanced in laboratory studies, and to learn their manual application in the workshop at stated periods, at least twice a week (to obtain this very object Mr. Seaver, superintendent of public schools in Boston, proposes to establish a Central Industrial High School in which the pupils may be instructed in the use of tools preparatory for actual life.) This is not in any sense a special course of study, but a general course in which the facts of science and art could be mastered in much less time and more pleasantly every way than are the abstract rules of rote lessons which can be of little or no subsequent benefit; and it is here that the approach between literary and manual instruction is revealed, and where they manifestly exert a mutual and co-operative influence. We insist that all this is perfectly consistent with the idea of general training in the principles of knowledge, for it is designed only to teach what is of great value to all the pursuits of life, without teaching a particular trade to any one. And it is claimed that a general training in the laws of nature will not only develop the intellectual faculties, but fit the student to master the special pursuit which he intends to follow. It may be objected that the knowledge thus acquired would be superficial and of little or no use, and that no important results would be worked out by any one having only a little knowledge in a little corner of some science. Remember that this training, in a great majority of instances, will be followed up by a special application in some particular branch of industry. It is therefore only preparatory to practical work. Elementary acquirements are about all that education can bestow, and we know that they generally suffice for success. To disparage them as superficial is therefore to disparage all educational acquirements. There are a set of important facts which are attainable at school, and which will be serviceable all through life, and they are about as far removed from profound erudition on the one hand, as they are from sciolism. This species of knowledge ought

ought to be included in what is taught by the school. In physics, for instance, how could the steam-engine be so well understood as by its presence in the workshop, and the analysis of its parts and powers explained in motion? How could picture-making, by the aid of a sunbeam, be so easily learned as from the camera of an actual operator; or the wonderful results of electricity, as when worked out by instruments intended for the illustration of these phenomena? It becomes evident by such examples that science is not the exclusive monopoly of the learned, but that it belongs to every man, woman, and child who passes through the public schools, and that it is as much a part of art and industry as of philosophy and physics. Having mentioned the City and Guilds of London Institute, I again advert to it as probably the most complete scheme of technical education that has been devised. It originated with the guilds or trades of the metropolis; and their principal object is to promote the advancement of technical education in the United Kingdom by a system of laboratory and workshop instruction with explanatory lectures, both in the daytime and in the evening, for the benefit of those who are engaged, or are about to be engaged, in industrial pursuits. The Finsbury Technical College is one of its adjuncts, and it establishes other branches, or assists those already established, in various parts of the country, with both means and teachers; and confers certificates upon all persons who can successfully pass examinations which it conducts in all the principal towns and cities where a sufficient number of those who are competent can be found. This work it has successfully prosecuted for the last three years, and it promises more for the future to the industrial classes than any other system in England, not even excepting the noble institution at Kensington, and its schools of art and science. The system coincides with the suggestions in this chapter, and fully vindicates the views just expressed. Our public schools would enable us to introduce technical training generally, and to make it omnipresent in the education of all the children, and consequently of the whole people.

#### THE THEORY OF SHOP-WORK.

The application of the educational idea to mechanic arts is strictly analogous in its application to chemistry and physics. In each the use of apparatus and the treatment of material is taught by systematic experiments in suitable laboratories. In each everything is arranged for the purpose of giving instruction in the principles involved and for acquiring skill in manipulation, and not for the sake of the production of saleable compounds of either drugs or apparatus. Chemical laboratories might be manufacturing, and mixtures might be made for sale, but the efficiency of such a laboratory for the purpose of education would be very small. So a manufacturing establishment can be made a place for instruction in the use of tools, but its cost would be great in proportion to its capacity, and the variety of work would be limited by its business.

Special trades are not taught. The scope of a single trade is too narrow for educational purposes. Manual education should be as broad and liberal as intellectual. A shop which manufactures for the market, and expects a revenue from the sale of its products, is necessarily confined to saleable work, and a systematic and progressive series of lessons is impossible except at great cost. If the object of the shop is education, a student should be allowed to discontinue any task or process the moment he has learned to do it well. If the shop were intended to make money, the students would be kept at work on what they could do best, at the expense of breadth and versatility. It is claimed that students take more interest in working upon something which, when finished, has intrinsic value than they do in abstract exercises. This is quite possible, and proper use should be made of this fact; but if all education were limited to such practical examples our schools would be useless. The idea of a school is that pupils are to be graded and taught in classes, the result aimed at being, not at all the objective product or finished work, but the intellectual and physical growth which comes from the exercise. Of what use is the elaborate solution in algebra, the minute drawing, or the faithful translation after it is well done? Do we not erase the one and burn the other with the clear conviction that the only thing of value was the discipline, and that that is indestructible? So in manual education, the desired end is the acquirement of skill in the use of tools and materials, and not the production of specific articles; thence we abstract all the mechanical processes and manual arts and typical tools of the trades and occupations of men, arrange a systematic course of instruction in the same, and then incorporate it into our system of education. Thus, without teaching any one trade we teach the essential mechanical principles of all. In accordance with the foregoing principles the shop-training is gained by regular and carefully graded lessons, designed to cover as much ground as possible, and to teach thoroughly the uses of ordinary tools. This does not imply the attainment of sufficient skill to produce either the fine work or the rapidity of a skilled mechanic—this is left to after years; but the knowledge of how a tool or machine should be used is easily and thoroughly taught. The mechanical products or results of such lessons have little or no value when completed, and hence the shops do not attempt to manufacture for the market.

#### APPENDIX E.

##### THE CITY AND GUILDS OF LONDON CENTRAL INSTITUTE. PLATES XI, XII, XIII, XIV, XV, AND XVI.

THE City and Guilds of London Central Institute for the Advancement of Technical Education is a magnificent institution, in the building of which the architect, Mr. Alfred Waterhouse, A.R.A., has developed the intentions of the executive committee in the broad spirit in which they were conceived. The Professors of the Finsbury College, the Presidents of the Royal Society, of the Institution of Civil Engineers, of the Chemical Society, and of the Society of Arts, have each acted on the sub-committee to whom the arrangements of this building have been specially intrusted, under the presidentship of Sir Frederick Bramwell, whose work has so remarkably contributed to the success of the institute. Plans of this building are given.

The Royal Commission with reference to this institute said that it is intended to give to London a first-class college in which technical teachers for the provincial schools may be educated, and in which those who are to be engaged in the superintendence of great industrial works may receive their preliminary training. The establishment of this central institution will, it is hoped, render unnecessary the recourse to foreign countries (where similar institutions already exist) for the technical instruction of managers of works, engineers, and industrial chemists, and will be welcomed by manufacturers, who feel the want in London of some such institution in which their sons, who are to succeed them, can obtain



as good an education as at Paris, Zurich, Munich, or Berlin. Just as the *École Centrale* at Paris is about to be removed to the immediate neighbourhood of the *Conservatoire des Arts et Métiers*, in order that the students may be near to the collections of machinery and other industrial objects which the *Conservatoire* contains; so the central institution of London is built near the Science Schools and National Museum of South Kensington.

Besides giving to the metropolis a Technical High School or Technical University for advanced instruction in the application of science and of art to industrial operations, the Central Institution, as a training school for teachers, as a focus for uniting the different technical schools now in existence, and as a centre for the dissemination of technical knowledge, is expected to be the means of increasing the efficiency of every department of the institute's work.

The erection of this institution and the provision of the necessary fittings, machinery, and apparatus cost about £135,000, nearly the whole of which sum has been provided by the liberality of the city and of the livery companies of London. The building is, for the most part, five stories high. [Plate XI.] In the basement are physical laboratories and mechanical workshops, three large shops at the back being top-lighted. [Plate XII.] The entrance hall is in the centre of the building, and leads to the great corridor which stretches from one end of the building to the other. Class-rooms, laboratories, and studios, for the teaching of physics, chemistry, mechanics, mathematics, and art, occupy the several rooms on these floors. Passing along the corridor on the right-hand side of the entrance hall there is found a small lecture-room, and further on a large class-room, lighted on both sides for the teaching of graphical statics. In the rear are two lecture-theatres, lighted principally from the sides, each of them capable of accommodating 250 students, and adjoining and communicating with each of these lecture-theatres is a room for the preparation of experiments. [Plates XII and XIII.] On the first floor over the entrance is a large reading-room and library. The offices for the administration are on this floor towards the north end of the building, terminating in the Council-chamber, on the walls of which are emblazoned the arms of the livery companies of London. [Plate XIV.]

On the second floor a large room intended for an art museum occupies the principal position in the centre of the building, with class-rooms and studios on the south side. The rooms in the south wing of the building are mainly occupied by the Physical Department. They are specially fitted up as laboratories for experiments in thermometry, calorimetry, and pyrometry, in the different methods of warming and ventilating, in the reflection, refraction, and polarization of light, and for the construction of optical instruments. Rooms are arranged for experiments in current and statical electricity, for testing the power and efficiency of dynamo-machines, of electric lamps and motors, for experiments in telegraphy, and in methods of ascertaining the resistance and capacity of specimens of submarine cables and of underground wires. [Plate XV.]

On the north side of the building are the rooms belonging to the chemical department.

On the third floor is a large room, 67 feet by 55 feet, used for a technological museum. [Plate XVI.]

At the northern extremity of the building on this floor is a refreshment room for students, and at the opposite end of the building is a large room in the chemical department, which is used as a professor's laboratory. A dark-room is arranged on this floor, and the roof is available for photographic operations and for chemical operations, which need to be conducted out of doors in the sunshine.

Descending a few steps of the staircase in the northern wing one comes to the general chemical laboratory for the performance mainly of analytical operations, and intended for the use of first-year students in all departments of the college, and beneath this laboratory are found two other laboratories, in which the larger operations incidental to research and technical chemistry are carried on. In the space between these laboratories is placed a gas-engine to supply the necessary motive-power. The large room at the end of the north wing, on the second floor, is specially fitted with apparatus and instruments for the performance of chemico-physical operations, and for microscopic studies in connection with brewing and other industries. On the same floor is a small class-room and preparation-room, and in the rear, and cut off from the main building, is a room entered by a balcony for operations involving the production of specially objectionable fumes.

The north end of the basement is occupied by the wood workshop, by a laboratory for experiments in mechanics, and by a shop for the construction of mechanical models. In the rear are three top-lighted sheds, one of which is used as a drawing-office, another is devoted to a mechanics' shop, and the third is fitted as a mechanical laboratory, and contains testing machines and other apparatus. Immediately adjoining this laboratory is the engine-room, which supplies power for the working of the machines in the mechanics' shop, and also contains an engine for experimental purposes. To the north of this room, separated by a wall, is a large laboratory used for carrying on metallurgical operations. The northern wing of the basement belongs to the physical department, and will be utilized for delicate electrical and other experiments requiring the employment of firm supports.

The Central Institute was opened for the reception of students in 1885. The fee for the complete course of instruction for those students wishing to qualify for the diploma is £30 per annum; but students are admitted to special courses on payment of lower fees.

The clothworkers' scholarship of £60 a year, tenable for two or three years, is annually competed for.

Arrangements have also been made for gratuitous courses of instruction to be given in the summer months to technical teachers.

## APPENDIX F.

REPORT OF THE COUNCIL OF THE CITY AND GUILDS OF LONDON INSTITUTE FOR THE ADVANCEMENT OF TECHNICAL EDUCATION, PRESENTED TO THE GOVERNORS AT A MEETING HELD ON WEDNESDAY, MARCH 31st, 1886.

In presenting to the Governors the Sixth Annual Report of the institute since its incorporation the council have to refer to the satisfactory progress that has been made during the past year in all departments of their work.

The fitting of the greater portion of the central institution has been completed, and a large accession of students is expected in October next.

At the Finsbury Technical College the number of day and evening students has increased, and the system of instruction is each year more generally appreciated. The

The attendance at the South London School has been satisfactory, and important testimony to the beneficial results of the teaching was afforded by Mr. Doulton on the occasion of the presentation to him by H.R.H. the Prince of Wales of the Albert medal awarded by the Society of Arts.

A still further increase is shown in the number of technical classes that have been established in connection with the Institute in different parts of the kingdom; and very gratifying evidence of the value of the system of technological examinations has been received in an application from the Board of Technical Education of New South Wales to extend the examinations to that colony.

The assistance which the institute has been enabled to give to the establishment of technical colleges in the provincial centres of industry, although very limited, has had the effect of evoking from manufacturers and others a large amount of local support which has fully justified the institute's expenditure under this head.

On February 1st of this year a technical school of metallurgy and of engineering was opened at Sheffield by Sir Frederick Bramwell, one of your Vice-Presidents and Chairman of the executive committee, in connection with the Firth college of that town. The school has received during the last year a subvention of £300 from the institute, and the local contributions have amounted to £11,500. In June, 1885, Sir Frederick Bramwell opened a new technical school at Bristol, erected and equipped by the Merchant Venturers' Company, which promises to be of great advantage to the artisan population of that city. Several classes are now being held in the school in connection with the institute.

In Leicester, the institute's donation of £700 towards the establishment of a school was supplemented by local donations and subscriptions to the amount of £3,500, and during the present session 239 students are receiving instruction in the registered classes of the institute in connection with the staple industries of the town. At Nottingham, very large local contributions have been made towards the equipment of a technical school. At Manchester, the institute's contribution of £200 a year for a period of three years, which expires this year, has been seconded by a large amount of local support.

The council refer to the above as some of the instances in which their timely help has been the means of evoking a large amount of assistance from manufacturers and others who are now very desirous of establishing in connection with their industries schools of applied science and art.

The inadequacy of the funds at the disposal of the council to meet the requirements of the several departments of the institute's operations, as indicated in their last annual report, has been so seriously felt since the opening of the central institution that it was found absolutely necessary to again appeal to the corporation and the livery companies of London for further help. The terms of the appeal were carefully considered by the executive committee, and the following letter, signed by the Vice-President of the institute, was forwarded to the courts of the several livery companies, and a petition to a similar effect has been presented to the corporation of London.

Gentlemen,—

As Vice-Presidents of the City and Guilds of London Institute, we have been requested by the council to draw your attention to the present financial position of the institute, and to point out to you that the funds at the disposal of the council for carrying on the important educational work initiated by the Corporation and the Livery Companies of London are as yet by no means adequate.

Within the short period during which the institute has been at work, the Finsbury Technical College and the Central Institution have been erected and equipped at a cost of about £135,000; an Industrial Art School has been established in the south of London; small subsidies have been granted towards the erection and maintenance of technical schools in the provinces; and more than 260 technological classes, attended during the past Sessions, by nearly 7,000 students, have been organized, and in part supported, in the principal manufacturing centres throughout the kingdom.

The council claim, therefore, to have substantially advanced the important objects for which the institute was established, viz., to place within the reach of those who are engaged, or who are about to engage, in productive industry the advantages of technical instruction.

The present income of the institute from subscriptions is about £24,500; but, owing to the continuous and rapid increase of their work, the council find it impossible, without further funds, to efficiently maintain, much less to improve, or to develop, their several technical schools and classes, in accordance with the growing needs of the metropolis and of the country generally.

After the most careful examination of the requirements of the Central Institution, in which, although the equipment of the building is not yet complete, courses of instruction are now being given, the council find that they are unable to carry on, as efficiently as they desire, the educational work of the institution without a large additional annual grant.

The number of students at the Finsbury Technical College has so greatly increased that an extension of the building has become almost indispensable, and the council are only waiting for the necessary funds to arrange for the additional accommodation now urgently required. This extension will necessitate a further grant for maintenance, which the council are at present unable to provide.

In the South of London, further facilities for technical instruction are so much needed that the council in their annual reports have repeatedly drawn attention to the importance of adding to their Art School a Science side, with the view of establishing in that part of the metropolis a school similar in many respects to the Finsbury College.

As regards the provincial work of the institute, there has been a large and growing increase in the number of students in attendance at the Evening Technological Classes, organized throughout the country, in connection with the institute's system of examinations; and the council, recognizing the importance of assisting local efforts to advance technical education in the manufacturing centres of the kingdom, where its value is greatly appreciated, are desirous of further extending this department of their work, for which purpose alone they require a considerable addition to their income.

This expansion of the institute's work has not been unexpected by those who have watched its steady progress. The treasurer of the institute, in giving evidence, in 1883, before the Royal Commission on Technical Instruction, stated that the cost of the maintenance of the Central Institution could not be much less than £15,000 per annum, and that the other branches of the institute's operations would require an annual expenditure of about £25,000.

Under these circumstances, we appeal to you, with confidence, to help in providing the additional support now needed.

We feel that it would be injurious to the industrial interests of the country, and altogether opposed to the wishes of the Corporation and the Livery Companies of London, that this great work, so successfully begun, should remain incomplete for want of the necessary funds to efficiently develop it.

We trust, therefore, that, having regard to the success that has already been achieved, and to the national usefulness of the work which the Council hope yet to accomplish, you will bring this appeal under the serious consideration of your Company.

We have, &c,  
SELBORNE.  
FREDERICK BRAMWELL.  
SYDNEY H. WATERLOW.  
B. N. FOWLER.

Gresham College, E.C., November, 1885.

In anticipation of this appeal, the Drapers' Company, in consequence of a communication made to them by their representatives on the council, voted the sum of £1,000 for the purchase of additional apparatus at the Finsbury Technical College, and they have since conditionally promised to increase their subscription from £4,500 to £6,000, with a view to assist the Institute in providing additional accommodation at the college for the art school and for the increasing number of students in other departments.

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The appeal is now under the consideration of the courts of several companies; but the council are gratified to be already able to report that the Mercers' Company have increased their subscription from £2,000 a year to £3,000, the Salters' Company from £525 to £1,000,\* the Ironmongers' Company from £350 to £500, the Skinners' Company from £500 to £1,500, the Clothworkers' Company from £3,000 a year to £4,000, the Leathersellers' Company from £500 to £750, the Carpenters' Company from £250 to £500, and the Coopers' Company from £105 to £157 10s., and that the Cutlers' Company have promised to contribute £105 per annum.

The council have also to express their satisfaction at the adhesion of the Merchant Taylors' and Saddlers' Companies to the institute. The former company have conditionally promised to contribute the sum of £300 a year for the organization of classes, prizes, and examinations in connection with the industry with which they are titularly associated, and the latter company contribute £300 a year for the establishment of exhibitions and prizes at the Finsbury Technical College, and for the general assistance of the institute's technological classes.

A donation of £52 10s. has been received during the present year from the Girdlers' Company.

Your council again refer to the great want of scholarships, particularly in connection with the central institution. They trust that the corporation will renew their valuable scholarship of £50 a year in memory of H.R.H. the Duke of Albany. The six scholarships founded by the Mitchell trustees, and the Hall Scholarship, the proceeds of a fund the interest of which is paid to the institute by the Court of Chancery, have proved of great benefit; and the council, recognizing the importance of these scholarships, again express the hope that, in the liberation of trust funds from purposes to which they are no longer applicable, the advantages of founding such scholarships will be duly considered.

The presentation of prizes to the students of the central institution of the Finsbury Technical College and of the South London School of Technical Art, as well as to the successful candidates at the technological examinations, who were examined at the institute's London centre, took place on December 9th, at the Salters' Hall, the Right Hon. the Lord Mayor (Mr. Alderman Staples) in the chair. The prizes were presented by Alderman Sir R. N. Fowler, Bart., M.P., whom H.R.H. the Prince of Wales has graciously nominated as a Vice-President of the institute. The meeting was more numerously attended than on any previous occasion. A full account of the proceedings will be found in Appendix A.

#### I.—CENTRAL INSTITUTION.

The equipment of this institution has been carefully proceeded with during the past year, and is now nearly finished. The council trust that H.R.H. the President may be pleased to visit during the present year the institution, and to inspect the laboratories and workshops in the several departments, which are probably the most complete of any in the United Kingdom.

The department of mechanics and mathematics comprises the ordinary lecture and class rooms, together with a drawing-room and a laboratory of mechanics.

The drawing-room is used for practice in problems connected with mensuration, graphical statics, projective and descriptive geometry, &c.

The laboratory is provided with apparatus for demonstrating those principles of mechanics of which the student will have to make constant use in all other branches of physics and in engineering. A chief aim also of the laboratory course is to make the student thoroughly acquainted with exact measuring instruments and methods, for which purpose the laboratory has been provided with apparatus for the measurement of time, length, and mass, including clocks of various kinds, an electrical chronograph, spherometer, cathetometer, balances, &c.

The engineering department consists of the drawing-office, the workshop, and the engineering laboratory.

The workshop comprises a joiners' shop, a smithy, and a mechanics' shop, provided with planing, shaping, drilling and milling machines, wood and metal lathes, and emery tool-grinder, and the necessary vices, screwing tackle, &c.

The engineering laboratory contains a 100-ton testing machine of the most accurate and complete description, with tension shackles for bars and plates of different sizes, and apparatus for compression and for transverse tests. Measuring apparatus of the most accurate kind is also provided. There are, besides, wire-testing and cement-testing machines.

Power is obtained from an experimental steam-engine of 25 nominal horse-power, arranged to work condensing or non-condensing, simple or compound. Arrangements are also made for varying the conditions of working (expansion, reservoir pressure, clearance spaces, &c.), and there is a large dynamometer for absorbing and measuring the work of the engine, and indicators, tanks, &c., for measuring condensing water and condensed steam. The arrangements serve for carrying out a series of comparative engine tests, and for measuring the steam and fuel consumption.

In the physical department separate laboratories are provided, in which first-year students receive instruction in the subjects of electricity, light, and heat. The plan so successfully developed by Professor Ayrton, at the Finsbury Technical College, of fitting up the various laboratories with a classified series of quantitative experiments, consisting of pieces or sets of apparatus, each complete in itself, and each arranged for the verification of some important physical law, has been adopted.

In the basement are two laboratories provided with isolated brick piers on deep concrete foundations for delicate experiments of a more advanced description.

On this floor is also the workshop in which special apparatus is made for the department, and in which the more advanced students will, as occasion arises, construct pieces of apparatus which may be required for purposes of experiment.

The dynamo-room is provided with an 8-horsepower compound engine and boiler, which drives a line of shafting fitted with coned pulleys, for experiments on dynamos at varying rates of speed in connection with investigations in electric lighting, electro-motors, transmission of power, &c.

Besides these laboratories there is a large lecture-theatre, capable of holding over 200 students, a small lecture-room, a room for the graphical recording of observations and for the designing by the more advanced students of physical apparatus, and a small museum for physical appliances and models. Other rooms belonging to the physical department are yet to be fitted.

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\* The sum of £500, being the first moiety of this subscription, was paid in November, 1885, and is included in last year's receipts.

The following are the main features of the arrangements in the chemical department :—

The large laboratory on the second floor has places for 42 students, each of whom will have on the bench in front of him a draught hood, under which experiments involving the production of objectionable fumes can be carried on, and under which also most of the gas-burners used for heating purposes are placed, so that the work will be conducted under the best hygienic conditions.

The two chief rooms in this department on the first floor are arranged for those more advanced students who may be engaged in research.

In the one room there are places for 16 students, each of whom will have at his disposal a bench 8 feet in length, provided with a draught hood, and along the sides of the room are large draught closets and benches for special operations. Taps for gas, water, and vacuum are provided on each bench.

The second room at present contains benches for only 12 students, whilst the centre of the room is occupied by large movable tables suitable for special operations on a large scale. Shafting driven by rope gearing from an engine in the basement is carried into each of these rooms. The narrow room between these two laboratories is arranged specially for combustion furnaces.

The large lecture-theatre on the ground-floor will accommodate 240 students.

A large room in the basement contains the above-mentioned engine, which is of the vertical type, and of 6-h.p. nominal. It drives a line of shafting, which is connected by rope gearing with a shaft on the second floor, from which the ventilating exhaust fan is driven. The fan is situated at the top of a wide stack, into which the various flues from the laboratories pass. In the engine-room are steam pans and stills, a centrifugal machine, a filter press, a dynamo machine, and other apparatus required in technical chemical operations.

In addition to the above principal laboratories and other smaller rooms for the accommodation of students engaged in special researches, there is a large balance-room, a photographic dark-room, and a room for gas analysis.

In the central institution London possesses, for the first time, an institution which is comparable with, and, in some respects, superior to a German Polytechnic School. Erected at less than a third of the cost of the Technical High School at Berlin, it is replete with all the appliances for the education of technical teachers and of persons who are training with the view of becoming mechanical, civil, or electrical engineers, or master-builders, or of taking the management of works in connection with any of our great chemical and other manufacturing industries. The advantages offered by the central institution will enable parents to secure, in England, for their sons technical instruction of the same high class as has been for so many years provided in the great technical colleges of the Continent, and better adapted to the special circumstances of home industry; and it is hoped that students trained in the central institution will gradually occupy the places in manufacturing works, and especially in chemical works, both in Great Britain and in the Colonies, which now for some years have been almost monopolized by the Germans and the Swiss.

Although the equipment of the building was, at the time, by no means complete, the first summer course for teachers was held in July of last year. The courses embraced the following subjects :—

The teaching of geometry in its technical applications, by Professor O. Henrici, F.R.S.

The testing of materials of construction, with some applications to the design of machinery, by Professor W. C. Unwin, M. Inst. C.E.

The teaching of electrical engineering, by Professor W. E. Ayrton, F.R.S.

Carriage-building, by Mr. G. A. Thrupp, Past Master of the Coachmakers' Company.

Plumbing, by Mr. W. R. Maguire.

The number of persons who attended these courses was 106. Several of the students came from distant parts of the country, and devoted their whole day to instruction. The professors of engineering and of physics took advantage of the unique collection of machinery in the International Inventions Exhibition to give demonstrations within the Exhibition on the subjects of their lectures.

A more extended course of technical instruction for teachers will be given in July next, in which the professors of the institution will be assisted by several of the examiners of the institute in giving lectures and laboratory teaching on special branches of technology.

The first session of the institution commenced in October last, and the number of students now in attendance is 105, of whom twenty-five have matriculated and take the entire course of instruction as laid down in the programme. Considering that the equipment of the college is not yet completed, and that in London it takes a considerable time to bring the advantages of an institution prominently under public notice, and having regard to the character of the entrance or matriculation examination, these results may be regarded as hopeful.

Special courses of lectures, to which outside students are admitted, are being now given on "Methods of determining the nature of complex carbon compounds," by Professor Armstrong; on "Some industrial applications of electricity," by Professor Ayrton; and on the "Differential and integral calculus, for engineering students," by Professor Henrici.

The fees received from students since the institution has been opened have amounted to £425 1s. Of this sum £391 was received in October last.

The total cost of the building, including architect's fees and other incidental expenses, had amounted, at the date of the balance-sheet, to £78,911 Os. 6d. Of the sum of £20,000—the originally estimated cost of fittings and apparatus—£17,716 5s. had been specially subscribed, in response to the appeal of H.R.H. the President, by the Corporation and many of the Livery Companies, the greater part of which has been already expended in furniture and fittings, and in providing machinery, permanent apparatus for the several departments, and such materials as were required for immediate use. Some additional machinery is now wanted in the engineering department, and a further supply of apparatus is very much needed in the departments of mechanics and of physics. There are still three or four laboratories in the physical department, which will soon be required for second and third year students, for the equipment of which no provision has as yet been made. A grant for providing books for the library is urgently needed, the only books which the institution as yet possesses being those presented by the International Health Exhibition, in addition to a few volumes received from publishers. Accommodation has been provided for about 12,000 volumes.

Some few gifts have been made to the Technological Museum by the Clothworkers' Company, by manufacturers, and others; but the funds at the disposal of the Council have not yet enabled them to arrange for the equipment of the museum with the necessary fittings.

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Of the sum of £8,800 voted by the Council from the subscription fund of the Institute to the current expenses of the Institution, the sum of £6,973 18s. 8d. was spent during the year 1885.

It is intended to extend the curriculum of the college, so as to provide complete courses of instruction for those who are preparing for other branches of engineering and for the building trade. To meet the expenses of the current year the Council have voted out of their anticipated income the sum of £10,000, in addition to the students' fees.

In compliance with a request of the Committee of the School of Art Wood-carving, on which are several representatives of the Institute, the school has been removed from the Albert Hall to the Central Institution, and now occupies two of the rooms set apart for instruction in applied art. In accordance with the original scheme the Council hope to be able to add to the subjects taught in the Central Institution other branches of applied art, in which, as in the School of Art Wood-carving, teachers may be trained for provincial classes.

## II.—FINSBURY TECHNICAL COLLEGE.

Important changes have taken place in the staff of the college during the past year. The valuable services of Professor Perry and of Mr. Brophy have been retained; but, as was anticipated in the last report, Mr. Philip Magnus has been unable to continue to discharge the duties of Principal of the College, and the Committee have had to fill up this vacancy, as well as those caused by the appointment of Professors Armstrong and Ayrton as Professors of Chemistry and Physics at the Central Institution. The Institute has been fortunate in securing the services of Professor Silvanus P. Thompson, D.Sc., B.A., late of University College, Bristol, in whom have been united the posts of Principal and Professor of Physics. They have been no less happy in their selection of Mr. Raphael Meldola, F.C.S., as Professor of Chemistry. These gentlemen commenced giving instruction in the college during the summer term of last year, and entered fully upon their duties at the commencement of the new session in October last.

During the session ending July, 16th, 1885, 158 students were in regular attendance at the college taking complete courses of instruction as laid down in the programme. Of these, 87 were in the department of electrical engineering, 45 in that of mechanical engineering, 20 in the chemical department, and 6 in the department of building trades. Of these, 9 were admitted as free students from the several schools to which exhibitions had been offered, viz.:—6 from the Cowper-street Middle-class Schools, 1 from the United Westminster Schools, 1 from the Haberdashers' School, Hoxton, and 1 from the City of London School, in addition to the holder of the Holl Scholarship, a pupil of the Cowper-street Middle-class Schools. The fees received on account of the day students during the past session amounted to £1,166 10s.

In the evening classes, 738 tickets were sold during the past session to 612 individual students. Of the 738 tickets, 111 admitted the students to complete courses. These complete courses for evening students are a special feature of the instruction at the Finsbury Technical College, and are intended to indicate to the student the particular subjects he should study during the three years' attendance at the College, in order that he may acquire a satisfactory knowledge of the principles of science, and of the technology bearing upon the industry in which he is engaged. Of the remaining 626 tickets, 145 were taken for physics and electrical technology, 131 for chemistry, 70 for mechanical engineering and mathematics, 180 for applied art, and 61 for the trade classes, including metal plate work, carpentry and joinery, and bricklaying, 23 for practical geometry, and 17 for a course on gas engines. Of the students attending these courses the great majority were artisans, 151 being apprentices, who, on producing their employers' certificate, were admitted at half the ordinary fees.

At the commencement of the new session in October last, 93 candidates presented themselves for the entrance examination in the day department of the College, and of these 76 were admitted, the numbers at the commencement of the preceding session being 81 and 65. At the examination held in January last 14 new students passed the entrance examination and were admitted. The day students now in the College are distributed as follows:—

	1st year.	2nd year.	Total.
Electrical Engineering Department .....	56	33	89
Mechanical Engineering Department.....	36	13	49
Chemistry .....	18	6	24
Building Trade } .....	6	.....	6
Applied Art }			
	116	52	168

The number at the corresponding period last year was 143. Of the 168 students now receiving instruction in the day department of the College, 13 have been admitted with exhibitions covering the amount of their fees, viz.:—6 from the Cowper-street schools, 1 from the United Westminster schools, 1 from the Haberdashers' School, Hoxton, 1 from the City of London School, 1 from the Stationers' School, 1 from the Mercers' School, 1 from the Grocers' School, and 1 from the Coopers' Grammar School, in addition to the holder of the Holl scholarship, a pupil of the United Westminster Schools. In accordance with the notice given in the last Report these students are now required to pass the entrance examination. Four of the students in the day classes have been admitted with exhibitions of £30 a year, established by the trustees of the City of London Mitchell Charity, and the four exhibitions founded by the Saddlers' Company were awarded for the first time in October last, and are now held by students of the College.

In the evening department a special course of lectures has been arranged by Professor Thompson, on optical instrument making, which has been attended by large numbers of members of the trade.

The council are gratified to be able to state that they have been enabled to carry out their intention as stated in their last report, of giving greater prominence, in the curriculum of the College, to the course of instruction to be pursued by those who are engaged in some branch of the building trade. Laboratories for plumbing, gas-fitting, and metal plate work have been fitted with appliances for giving practical instruction in these subjects. With the view of increasing the efficiency of the instruction for these industries a class in builders' quantities has been added to the programme. In

In the applied art department, *repoussée* metal work and plaster work have been added to the other trade subjects in which instruction is now afforded.

There is a large increase in the attendance of evening students since October last. In the term ending December, 1885, 662 class tickets were sold to 612 individual students. The number of students on the class register of the College is now as follows:—Machine design, 67; practical mathematics, 44; practical geometry and metal plate work, 72; electrical technology, 169; inorganic chemistry, 80; organic chemistry, 30; drawing and design, 158; gas, 28; carpentry and joinery, 40; bricklaying, 4; practical physics, 33; optical instrument making, 84; plumbing and gas-fitting, 11; and builders' quantities, 13.

The students' fees during the past term have amounted to £1,329 14s., of which £940 was received in the Day Department, and £389 14s. in the Evening Department.

The total cost of maintenance of the Finsbury College during the past year has amounted to £8,130 6s. 9d., including the sum of £1,201 1s. 8d., the cost of permanent apparatus, towards which the Drapers' Company have made a special grant of £1,000. The students' fees during the past year have increased from £1,483 3s. 6d. to £1,756 14s.

In response to the liberal offer of the Drapers' Company to increase their subscription to the funds of the Institute from £4,500 to £6,000, with the view to the extension of the Finsbury Technical College, the council have agreed to spend a sum not exceeding £17,500 on account of the building and equipment in providing the additional accommodation now so urgently needed.

### III.—SOUTH LONDON SCHOOL OF TECHNICAL ART.

The attendances at the several classes of the school during the session ending July, 1885, was as follows:—

Subjects.	Male.	Female.	Total.
Modelling .....	53	6	59
Design (elementary) .....	4	27	31
Design (advanced) .....	11	11	22
Wood Engraving .....	3	15	18
Life Classes (Drawing and Painting).....	33	11	44
	104	70	174

On comparing this with the statement in the last report, it will be seen that in spite of the great depression in the various art industries of Lambeth and the neighbouring districts, the school is not affected so far as regards the total number of students in attendance, which is precisely the same as in the preceding year.

There has been a considerable increase as regards the life classes, whilst there are somewhat fewer students receiving instruction in elementary design, the advanced class in that subject more than maintaining its numbers. Instruction in wood engraving appears to be mainly sought by female students.

The occupations of the students are as follows:—31 designers, 28 stone-carvers, 18 wood-engravers, 16 china painters, 12 art students, 10 modellers, 9 teachers, 8 clerks, 6 draughtsmen, 6 wood carvers, 3 lithographers, 2 glass painters, 1 builder's apprentice, 1 chemist, 1 working jeweller, 1 photographer, 1 bootmaker, 1 house decorator, 1 mould maker, 1 moulder, and 4 of no occupation.

A class has recently been formed for instruction in art metal work, and arrangements have been made with Messrs. Starkie, Gardiner, & Company, for the use of their workshops by pupils of the school, and the council have offered, under certain conditions, free studentships to those who are prepared to qualify themselves in this branch of industrial art.

It is much to be desired that classes for glass painting and house decoration could be organized; but for this greatly increased accommodation is required.

The total cost of maintaining the school during the year 1885 has amounted to £1,246 4s. 4d., and the students' fees have amounted to £123 6s.

To the importance of attaching a science side to this school, frequent reference has been made in the Institute's reports.

### IV.—TECHNOLOGICAL EXAMINATIONS.

From the Director's Report it will be seen that at the examination in May last 8,968 candidates presented themselves, of whom 2,168 passed. There is a very perceptible improvement in the character of the work sent up for examination. From the returns furnished in November last it appears that during the present session 7,660 students are in attendance at 329 classes in forty-two different subjects. The classes are distributed over 116 towns in the United Kingdom. The number of students in attendance at the Institute's classes would be much greater were it not for the fact that no payment is made to teachers on the results of the examination of persons other than artisans actually engaged in the trade to which the teaching refers. The technical classes are beginning to attract a considerable amount of interest on the part of manufacturers, who show more desire than they have ever previously shown that their employees should take advantage of the opportunities of receiving technical instruction which are now afforded. In many places these classes have developed into well equipped technical schools, in the establishment of which voluntary effort has succeeded in obtaining from local sources valuable support.

The new programme issued in August last has been carefully revised, and contains some important additions. The subject of brickwork and masonry has been introduced. The syllabus of the subject coal-tar products, has been rewritten, and has been divided into two sections—coal-tar distillation, and the manufacture of coal-tar colouring matters and other products. The subject of fuel has also been modified so as to include so much of engineering as is connected with the arrangement of furnaces, &c. A new syllabus on the raising and preparation of ores has been substituted for that on the mechanical preparation of ores, with the view of making the examination more useful to the Cornwall miners; and the ordinary grade in mine surveying has been somewhat simplified, so as to make it better serve as a preparatory stage for the honours examination. The subject of printing has been subdivided into typography and lithography, and numerous other changes have been made with the view of bringing the subjects of instruction into closer connection with the requirements of different trades. A most important change has been the division of each syllabus into two parts showing the subjects to be studied in each year for the examination in the ordinary and in the honours grade.



A practical examination in typography will be held this year for the first time at the several printing offices in different parts of the country, which have been placed at the disposal of the Institute. With the view of enabling candidates in subjects connected with the manufacture and designing of textile fabrics to have the advantage of daylight for the analysis and composition of patterns, the examinations in these subjects will be held on the Saturday afternoon following the Wednesday evening on which the other examinations of the Institute are held.

Examinations were held last year for the first time in framework knitting, and in boot and shoe manufacture. Most of the candidates who presented themselves in these subjects were students of the newly erected Technical School of Leicester. In the subject of boot and shoe manufacture, classes are now being held at Northampton; and, recently, the representatives of the Boot and Shoe Manufacturers' Association have been in communication with the Institute with the view of arranging for the establishment of classes for apprentices and others engaged in this trade in London.

Your Council refer with great satisfaction to the success of this department of their work, which they are desirous of still further developing. There are industries for which no provision in the programme has yet been made. There are other trades, such as watch and clock making, for instance, in which the conditions of manufacture have of late years so greatly changed that corresponding modifications are necessary in the subjects of instruction. The Council hope to be able to encourage by means of prizes, and by assisting in the payment of the teachers, systematised instruction in various branches of applied art, such as wood and stone-carving, metal chasing, plastering, &c., and they hope to be able as their funds increase to make some addition to the grants now paid on the results of the examinations in technology, in order that registered teachers may receive more adequate remuneration.

The total cost of the technological examinations for the year 1885 was £3,517 1s. 3d.

The Council, believing that whatever tends to unite more closely the Colonies with the mother country is calculated to materially improve their mutual trade and commerce, would be glad to be enabled to send a favourable reply to the application of the Board of Technical Education, New South Wales, for the extension of the Institute's examinations to the Colony. Your Council accordingly recommend the Governors to authorise them to accede to the application they have received, provided that no part of the additional cost of the examinations is borne by the Institute, a stipulation rendered necessary by the Memorandum of Association.

#### V.—GRANTS IN AID OF OTHER INSTITUTIONS.

(A) *Metropolitan Schools and Colleges*.—The following statements will show that satisfactory work has been done in the several schools to which the Institute has continued its grants.

*University College and King's College, London*.—The Institute's grant of £400 a year to each of these Colleges has been continued.

Professor Kennedy again reports that there has been a considerable increase in the number of students attending the various courses of instruction in the Engineering Department of University College.

Extensive additions have been made to the appliances in the laboratory, including a large new boiler, a beam-testing machine, a cement tester, and an accumulator, with a Davey engine for pumping.

Several students have, on the nomination of the Institute, received free instruction in engineering.

In the Department of Chemical Technology the number of students attending the lectures of Professor Graham is now sixty-four, whilst there are twenty-five working daily in the laboratory, three of whom receive free instruction on the nomination of the Institute. At the last technological examinations ten of the students presented themselves, obtaining five silver and two bronze medals, whilst the remaining three passed in the honours grade. Of these ten students eight have since obtained situations in works of different kinds, their appointments in each case being in a measure due to their success in the Institute's examinations.

Professor Graham again draws attention to the great and growing appreciation in which the technological examinations are held by manufacturers.

Inasmuch as the Central Institution now provides instruction of an advanced order in engineering and chemical technology, it will become a question whether the grants in aid of these chairs at University College should be renewed.

The Metallurgical Department at King's College has made good progress. During the past year the various classes have been attended by 110 students, as against 102 in the previous year. The total number attending the evening classes is 67, as against 64 last year, several of whom have been admitted on the nomination of the Institute without payment of fees. Some of these students took high places in the technological examinations.

In the school of practical fine art the work has gone on steadily during the past year, and there have been a good number of applications for studentships. Many of the old students who have left the school are now engaged on permanent work.

*School of Art Wood-Carving*.—The school was removed in July last year from the Royal Albert Hall to the Central Institution, where rooms have been granted for its use by the Council of the Institute. It is steadily growing in public favour, as will be seen from the subjoined statement of the numbers and distribution of the students in attendance during the year. Not only has the number considerably increased (from 73 to 102), but the average period of attendance has been augmented.

	Free Students.		Fee-paying Students.		Total.
	Male.	Female.	Male.	Female.	
Day Classes .....	6	6	12	50	74
Evening Classes .....	17	1	7	3	28
	23	7	19	53	102

The following are the more noteworthy of the works executed by the students during the past year:—

The whole of the carving for the Library at Ingestre Hall, viz.:—A carved oak mantel and over-mantel 9 feet by 13 feet; a double door 10 feet by 13 feet, besides cresting and uprights for the book cases; seven pine chimney-pieces for Colonel Miles; two carved oak panels for H.R.H. Princess Louise, Marchioness of Lorne; a carved oak door; a carved Flemish cabinet in walnut for Mr. E. J. Roberts; a carved walnut screen; an oak clock case with figures; a carved Italian chair, besides numerous panels, frames, and works of minor importance.

Classes for wood-carving have been started at the following centres, by teachers from the school:—One in connection with the North London Collegiate School for Girls, one at the Langham Chambers, one at Milton Mount College, Gravesend, and an evening class for men and boys at Fulham. A student from the Cork School of Art has also been in training at the school with the intention of continuing the class for wood-carving at Cork, already established by a student of this school, who has now resigned the work.

There is a large increase in the number of classes throughout the country where wood-carving is taught, and in many instances the teachers have been trained at the school.

To bring the benefits of the school more within the reach of the artisan class a remission of half fees has been made to the artisan-students connected with the trade.

*British Horological Institute.*—The annual subsidy of £350 to this school has been continued. The number of students receiving practical instruction in the workshop in various branches of watch-making has increased from thirty to forty. Besides the practical instruction in the day school on Mondays, Tuesdays, Wednesdays, Thursdays, and Fridays, from 10 till 5, theoretical instruction is given on Monday, Tuesday, and Thursday evenings, the course being attended by the day students as well as by others.

Practical evening classes, at present attended by twelve students, are held on Mondays, Wednesdays, and Fridays, and evening classes for instruction in mechanical drawing are held on Tuesdays and Thursdays.

The classes for instruction in mechanics and theoretical horology and for drawing are each attended by forty students. Most of the students presented themselves at the Institute examination in watch and clock making, and several were successful in passing. The possibility of still further adapting the teaching in this school to the present requirement of the trade is now under consideration.

*Society for Promoting Employment of Women.*—Of the sum of £100 granted by the Council for the payment of apprenticeship fees, £75 has, on the recommendation of the Society for Promoting the Employment of Women, been devoted by the sub-Committee to the apprenticeship of three girls as decorative artists.

(B.) *Provincial Institutions.*—The following statements show the satisfactory results of the grants made by the Institute to provincial schools and colleges.

*Sheffield Technical School (Firth College).*—This school, towards the maintenance of which the Institute has made a conditional grant of £300 per annum for five years, has made rapid progress.

A donation of £2,000 has been made by the Town Trustees to the fund, which now amounts to £11,500.

Your Council have asked the master, for the time being, of the Cutlers' Company, of London, to represent them on the governing body of this school.

During the past year the site of the old Grammar School, with the buildings thereon, has been purchased, the old buildings have been altered, and a new three-storeyed building, with a basement area of 750 square yards, has been erected, at a total cost of £11,000.

The old buildings thus adapted provide a metallurgical lecture-room, seating 140 students, and an engineering lecture-room, accommodating 80 persons, besides two rooms devoted to purposes of museums.

In the new building is a metallurgical laboratory, 42ft. 9in. by 35ft., and 21ft. in height, provided with wind and muffle furnaces, working benches, &c. Adjoining are separate balance, store and attendants' rooms, with a professor's room and a preparation room. The basement contains besides these a large metal testing room and a machine shop, containing five lathes of 6-in. to 10-in. centres, planing, shaping and drilling machines, fitters' benches and vices, &c.

On the first floor is a large pattern shop provided with a 30-in. circular saw, a 6-in. treadle lathe, joiners' benches, with a full complement of bench tools. On this floor are also an engineering laboratory, a mining lecture room, a library and reading room, and two class rooms.

On the second floor is a large drawing office, 97ft. by 27ft., fitted up with tables and every necessary for complete drawing office practice, and communicating with a professor's room and a lecture room for machine construction.

In a wing of the main building is the engine-house, containing a 20-horse-power vertical tubular steel boiler, and a steam-engine arranged to work either as a simple high-pressure engine, as a compound engine, or as a condensing engine, and adjoining are a small smiths' shop and foundry.

In October last, whilst the buildings were yet incomplete, day classes in metallurgy, mechanical engineering, and engineering drawing, were commenced, and have since been in successful operation. Evening classes were also held in these subjects with considerable success.

The metallurgical laboratories have been opened since the vacation for both day and evening students, and the mechanical workshop is now ready for the reception of students.

The full course for the engineering diploma will extend over three years, but a certificate may be obtained at the end of two years. The metallurgical course will extend over two years.

Students wishing to attend the engineering course are required to pass an entrance examination in elementary mathematics very similar to that at the Finsbury Technical College.

*Leicester.*—The Technical School, Leicester, has now been in operation for more than a year. Mr. William Bohm, Past Master of the Framework Knitters' Company, has kindly consented to act as representative of the Institute on the governing body of the school. During the past year the classes for instruction in framework knitting, and in the manufacture of boots and shoes, have been continued, and new courses of instruction in the chemistry of wool dyeing, in mechanical engineering, and in plumbers' work, have been commenced. It has been found necessary to divide the instruction in frame-



work knitting into two classes, elementary and advanced, whilst the boot and shoe class has been taught in three sections, with special instructors for clicking and pattern-cutting, for making and finishing, and for machine work. During the spring Mr. J. G. Ward will give a course of lectures on the various skins and materials used in the trade, and Mr. Poyser will repeat the course which he gave last year, on the anatomy of the foot.

The number of students in attendance at the several classes is as follows:—Framework knitting, 98; boot and shoe manufacture, 95; wool dyeing, 21; mechanical engineering, 11; plumbers' work, 14; making a total of 239.

The number of applications for admission to the classes in boot and shoe manufacture was so large that it was necessary to issue a circular in October, saying that no more students could be admitted.

At the Institute's examination in May last twenty-five students of this school passed in boot and shoe manufacture, whilst fourteen were successful in framework knitting.

Considerable alterations have been made in the arrangements of the workshop, giving room for additional students. It is, however, quite evident that the present accommodation is still insufficient, and the success of the classes shows that there is in Leicester scope for the development of technical education in various directions.

*Manchester.*—The third instalment of the Institute's promised subscription of £200 for three years to the Manchester Technical School has been paid. Mr. John Slagg, member of the late Royal Commission on technical instruction, is good enough to continue to act as your representative on the council of this school.

There has been a continued increase in the number of students attending the school, the figures being 1,897 at Christmas, 1885, as compared with 1,688 at the same date in 1884.

The number of students in classes connected with the Institute is 505, as against 344 last year. In other technological subjects, 214, inclusive of a successful class in dressmaking.

In addition to the subjects already taught under the Institute's scheme, six others have been established, viz.—Brewing, lubricating and illuminating oils, brickwork and masonry, metal plate work, plumbing, and lithographic printing, which makes, in all, 19 out of the 35 subjects included in the Institute's syllabus.

At the recent technological examinations 127 students were successful, as against 107 in 1884.

The most notable event of the year has been the establishment of a manual training school for boys of 13 years of age and upwards, whose educational attainments are at least equal to the sixth standard of the elementary schools. In addition to the ordinary subjects of instruction the curriculum embraces book-keeping, mathematics, freehand, geometrical, and mechanical drawing, theoretical and practical chemistry, together with instruction for two hours daily in the use of wood-working tools.

For the due equipment of this department the council have fitted up one of the largest rooms with 20 joiners' benches, 20 lathes, and 60 complete sets of tools, at a cost of nearly £350. The number of pupils in attendance is 53.

Thirty day students have entered for the course of instruction in mechanical engineering, as against 18 in 1884. With the view of giving better accommodation in this department, the basement has been lowered, paved with wood, and otherwise improved, at a cost exceeding £200.

Your council have now under their consideration an application for the renewal of their grant to this school.

*Nottingham.*—The third instalment of the Institute's grant of £300 per annum for five years to the engineering department of University College, Nottingham, has been paid. The evening classes have not been quite so numerous attended as during last year, but satisfactory progress has been made in the day department; the number of day students who devote the whole of their time to the study of engineering having largely increased.

Classes are now carried on in mensuration and mechanics, fitting, turning and foundry, lace manufacture, carpenters' work, mechanical engineering, use of tools, iron and steel manufacture, practical telegraphy, electric lighting and electrical measurements. A class has recently been commenced for the study of hosiery and hosiery machinery, and is already attended by 50 students.

In October last Mr. John Westmoreland was appointed to the Professorship of mechanics and engineering in the place of Professor Ryan, who has been appointed to a Professorship at University College, Bristol.

*VI. Finance.*—The gross income of the Institute for the past year, including subscriptions that have not yet been received, amounted to £28,550 10s. 10d., as against £25,864 18s. in the previous year. The income is made up as follows:—

Subscriptions ... ..	£26,150	0	0
Interest ... ..	74	12	9
School fees, &c. ... ..	2,325	18	1

The subscriptions show an increase, which is due to the additional contributions, of £1,000 from the Mercers' Company, of £500 from the Skinners' Company, of £250 from the Leathersellers' Company, and of £52 10s. from the Coopers' Company, and to a subscription of £300 from the Saddlers' Company. The school fees, &c., have increased from £1,661 7s. 1d. to £2,325 18s. 1d.

The total expenditure of the Institute during the past year in connection with all branches of its work has amounted to £23,832 19s. 2d., not including the sum of £657 3s. 7d., being the part of the draper's special grant of £1,000 which had been expended at the date of the balance sheet.

The current expenses of the Central Institution during the past year amounted to £6,973 18s. 8d., being £6,983 8s. 6d. as shown in the account of income and expenses, less £9 9s. 10d. for books, stationery, &c., purchased by the students. The grant voted by the Council was £8,800, and the students' fees amounted to £425 1s.

The cost of maintenance of the Finsbury Technical College has amounted to £7,473 3s. 2d. This amount is made up of the sum of £7,062 10s. 10d., as shown in the accounts, together with £543 18s. 1d. the current expenditure on apparatus, less the sum of £133 5s. 9d. for books, materials, &c., purchased by students. It does not, however, include the sum of £657 3s. 7d., expended for apparatus out of the Drapers' Company's grant. The annual grant of the Council is £6,000, and the students' fees amounted to £1,756 14s. The Sub-Committee have spent, therefore, only £5,716 9s. 2d. of the amount voted, and have a balance of £283 10s. 10d., which, together, with the sum of £342 16s. 5d., the unspent balance of the Drapers' Company's special donation of £1,000, will be carried forward to the credit of the college.

The

The expenses of the South London School of Technical Art have been £1,246 4s. 4d. The fees amounted to £123 6s., which, together with the grant of £1,150, leaves a balance in hand of £27 1s. 8d.

The expenses in connection with the technological classes and examinations have amounted to £3,517 1s. 3d. The grant was £3,250, and the sale of programmes, &c., has brought in £20 17s. 1d. The expenditure under this head has, therefore, exceeded the amount of the grant by £246 4s. 2d.

The sum of £1,475 has been spent in metropolitan grants, including the payment of apprenticeship fees, which is £25 less than the sum voted for the purpose. The provincial grants, particulars of which have already been given, have amounted to £800.

The cost of general administration has been £2,263 13s. 11d., which is £36 6s. 1d. less than the sum voted by the Council; and there has been an expenditure of £83 17s. 10d. in scholarships, consisting of £19 17s. 10d., the excess of the Holl scholarship paid by the Institute, and £64, being the amount paid on account of the four Saddlers' Company's Studentships for the term ending Christmas, 1885.

A summary of expenditure is given in the following table, and also the corresponding items of the preceding year:—

	1885.	1884.
	£ s. d.	£ s. d.
Central Institution .....	6,978 18 8	923 19 10
Finsbury Technical College .....	7,478 3 2	7,292 13 5
South London School of Art .....	1,246 4 4	1,217 18 10
Technological classes and examinations .....	3,517 1 8	3,064 15 7
Metropolitan grants .....	1,475 0 0	1,485 0 0
Provincial grants .....	800 0 0	1,185 0 0
Administration .....	2,263 13 11	2,167 6 2
Scholarships .....	83 17 10	19 17 10
	<b>£23,832 19 2</b>	<b>17,346 11 8</b>

The decrease in the amount of provincial grants is due to the payment in 1884 of the second and last instalment of £350 towards the erection and equipment of the Leicester Technical School.

The following table gives the net expenditure, after deducting students' fees, &c., on the several branches of the Institute's work and the grants sanctioned by the Council:—

Department of Work.	Amount voted.	Amount spent.
	£ s. d.	£ s. d.
Central Institution .....	8,800 0 0	6,548 17 8
Finsbury Technical College .....	6,000 0 0	5,716 9 2
South London School of Art .....	1,150 0 0	1,122 18 4
Technological classes and examinations .....	3,250 0 0	3,496 4 2
Metropolitan grants .....	1,500 0 0	1,475 0 0
Provincial grants, &c. ....	1,000 0 0	800 0 0
Administration .....	2,300 0 0	2,263 13 11
Scholarships .....	.. .. .	19 17 10
	<b>£24,000 0 0</b>	<b>£21,448 1 1</b>

The following table shows the amounts, exclusive of students' fees, &c., voted to, and expended by, each Sub-Committee:—

	A.	B.	C.	D.	Total.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Amount voted .....	8,800 0 0	2,300 0 0	7,000 0 0	5,900 0 0	24,000 0 0
Amount expended .....	6,548 17 8	2,263 13 11	6,536 7 0	6,094 2 6	21,448 1 1

The income of the Institute for the year 1885, arising from subscriptions, including those still uncollected, amounted to £26,150. Of this sum £64 has been spent for scholarships out of the Saddlers' Company's subscription, and £21,443 1s. 1d. has been expended in the conduct of the several branches of the Institute's operations, showing a balance in hand for the year of £4,642 18s. 11d., of which £288 10s. 10d. must be carried to the credit of the Finsbury College.

It is hoped that the subscriptions for the year 1886 will not be less than £30,000, which is the minimum sum required, so that the council may receive the additional £1,000 promised by the Clothworkers' Company.

The expected contributions at present amount only to £27,550, in which sum is included the contribution of £2,000, which has now for some years been voted by the Grocers' Company, and which the council of the Institute sincerely trust may be renewed if not increased. It also includes the increased subscription of £1,500 from the Drapers' Company, to be devoted to the extension of the Finsbury Technical College, as well as the additional contribution from the Clothworkers' Company and the subscription of the Saddlers' Company, out of which the sum of £200 is required for scholarships. The council have not included in the sum of £27,550 the grant of £2,000, for five years now expired, voted by the

the Corporation, which they have every reason to hope may be renewed and augmented. Pending the decision of the Corporation and of the several companies now engaged in considering the vice-president's appeal, the council have made the following grants for the current year:—

Sub-committee A—					
Central institution	...	...	...	...	£10,000
Sub-committee B—					
General administration	...	...	...	...	2,400
					£12,400
Sub-committee C—					
Finsbury Technical College	...	...	...	...	6,000
Provincial agencies and contingencies	...	...	...	...	1,200
					7,200
Sub-committee D—					
Technological classes and examinations	...	...	...	...	5,000
South London School of Art	...	...	...	...	1,200
Metropolitan grants—					
University and King's Colleges	...	...	...	...	800
Horological Institute	...	...	...	...	350
School of Art Wood-carving	...	...	...	...	250
Apprenticeship of women	...	...	...	...	100
Contingencies	...	...	...	...	200
					7,000
					£27,500

The whole of the building fund, amounting to £14,591 10s., with the exception of £500, has been already received; and of the equipment fund of the central Institution, amounting to £17,716 5s., there are still contributions of £3,000 to be paid during this year and the two following years. The sums already paid on account of the building of the central Institution amount to £78,911 8s. 6d., including the cost of foundations for machinery, architect's fees, &c. Of the £20,000, the estimated cost of fitting and furnishing the building, and of providing the necessary apparatus, the sum of £15,729 15s. 8d. has been already expended. A further expenditure of about £3,500 has already been authorized, and it is expected that an additional sum of nearly £3,000 will be required for completing the fittings and for apparatus, which will bring the total cost of the erection and equipment of the building to about £100,000, as previously stated. There is also a sum of about £230 not yet paid, on account of the Finsbury Technical College, which is included in the amount of £35,000, the estimated cost of the building and of its equipment. To meet these items of expenditure there remains to be received £500 on the Building Fund, and £3,000 on the equipment fund; and there is a balance of £6,431 3s. 9d., being £8,407 15s. 6d., as shown in the balance sheet, less the amounts due for unpaid accounts, and less the sum of £626 7s. 3d., to the credit of the Finsbury College.

With the help of the additional subscription generously promised by the Drapers' Company, the council will be enabled to provide for the much needed extension of the Finsbury College; but funds are still urgently required for the establishment of a science side to the Technical Art School in Kennington Park Road. The absence of facilities for higher technical education in South London is greatly felt by the inhabitants, and the council hope that increased contributions will enable them during the present year to take steps for meeting this want.

The council again refer to the importance of encouraging technical education in elementary schools by the establishment of workshops for instruction in the use of tools, and they hope that the funds to be placed at their disposal may enable them to extend their operations by assisting in this movement.

From all parts of the country important and satisfactory evidence is received of the value of the instruction which the liberality of the city and guilds of London has enabled your council to provide; and, justified by the results of the work already accomplished, they confidently appeal to their constituents to continue their support, in order that adequate facilities for acquiring technical skill and knowledge may be afforded, through the agency of the Institute, to those who are engaged, or preparing to engage, in the various trades and manufactures of the country, whether as apprentices, journeymen, foremen, or managers.

SELBORNE,  
Chairman of Council.

## APPENDIX G.

### GERMANY.

#### REGULATIONS FOR QUALIFICATION AS A PRIVATE TUTOR IN AGRICULTURE AT HIGH AGRICULTURAL INSTITUTIONS IN GERMANY.

THE admission as private tutor into one of the higher schools for agriculture can only take place two years after the candidate has completed his academical course.

The application must be accompanied by:—

- The final examination certificate (Maturitäts-Zeugnis) of a Gymnasium or a Real-Schule of the 1st class.
- A certificate of at least three years' study at some higher agricultural school or university, out of which time at least one year must have been spent at a university.
- A reference to prove that the applicant has been for at least two years practically engaged in agriculture.
- The doctor's diploma obtained at a German University by graduation after oral examination and by means of a published dissertation.
- This doctor's dissertation, and
- An essay written on application for the post of tutor. The applicant may substitute for these last two named documents any scientific works of his own either printed or in manuscript.

When

When the director has circulated this application and the accompanying papers amongst the council of the institution they have to decide whether the applicant is entitled, by reason of these certificates of training, to be admitted to the qualifying examination.

Then follows the examination in the form of a trial lecture, to be delivered before the teachers, followed by a discussion on the subject.

The subject for the trial lecture is to be chosen by the council from not less than three subjects proposed by the candidate.

The discussion, in which all the members of the teaching body are entitled to take part, and which is to take place under the guidance of the director, is substantially to be confined to the contents of the lecture and the scientific works of the candidate, and is to give evidence not only of the candidate's attainments, but also of the independence of his views and his own aptitude for scientific work.

On the close of the discussion the teaching body have to decide whether the candidate is to be admitted as private tutor, and the director must acquaint him with their decision.

The Minister for Agriculture is to receive due information respecting every appointment, and the abovenamed papers are to be submitted to him, together with full particulars as to the results of the trial lecture and the discussion.

An exemption from any of the above conditions can only be obtained on the proposition of the council and by the special consent of the Minister for Agriculture.

Berlin, May 18th, 1877.

FRIEDENTHAL,  
Minister for Agriculture.

#### REGULATIONS FOR THE FINAL EXAMINATION FOR ORDINARY PUPILS OF THE AGRICULTURAL HIGH SCHOOL IN BERLIN.

##### Section 1.

The leaving examinations of these pupils take place towards the end of the half-year. Names must be given in writing to the rector at least eight weeks before the end of the half-year.

##### Section 2.

Admission to the examination will, as a rule, depend upon four half-terms having been kept. Study at any other agricultural high school or academy or university agricultural institute will be counted as full time, while study at a university or technical high school, so far as it embraces political economy or natural science, may, according to the discretion of the examiners, be reckoned as time not exceeding two terms.

##### Section 3.

The examination is both *visà voce* and in writing.

##### Section 4.

For the written examination two subjects will be set—one in agriculture, and one in natural science.

In natural science the candidate may select from the five last subjects which are enumerated under section 5 those from which he desires that the theme for examination should be chosen.

The books he has made use of in writing his essay are to be stated, and the candidate is to certify in writing that he has received no other help. The essays must be sent in five weeks after the subjects have been set. They will be handed over for inspection to the examiners who represent these particular subjects in the agricultural high school; and the rector, as president of the examining commission, will affix to each paper its award of merit.

Should both papers be marked "unsatisfactory" the candidate will be excluded from the rest of the examination.

##### Section 5.

The *visà voce* examination will be held in private, and will embrace the following subjects:—

- Agriculture and cultivation of plants.
- Rearing of animals.
- Theory of management.
- Political economy.
- Physics.
- Chemistry.
- Botany, with special reference to the physiology of plants.
- Zoology and animal physiology.
- Mineralogy and geology.

##### Section 6.

The result of the examination, both *visà voce* and in writing, will be indicated by awards as follows:—

Excellent, good, satisfactory, unsatisfactory, affixed to each subject, and will be determined by a majority of the examiners, after the examiner in the special subject shall have recorded his opinion.

There will be no general report on the examination as a whole. The certificate of examination to be given to the candidate will be signed in the name of the examining commission by its president.

No certificate of examination will be awarded to any candidate whose *visà voce* examination is "unsatisfactory" in more than four subjects (Section 5).

##### Section 7.

No exceptions can be made to the above regulations, section 1 to section 6, unless determined by the select committee and with the consent of the Minister for Agriculture, Domains, and Forests.

By order,

Berlin, February 14th, 1882.

HEYDER,  
For the Minister for Agriculture, Domains, and Forests.

## INSTRUCTIONS TO THE DIRECTORS OF THE WINTER SCHOOLS ESTABLISHED IN RHENISH PRUSSIA.

DURING the five winter months from the 1st of November to the 1st of April the director is to give instruction in his school in natural science and in agriculture. The remaining seven months he is to spend as travelling lecturer (Wanderlehrer) in his school district.

His services belong entirely to the society, and he is not permitted to undertake any other professional occupation.

2. In his double capacity of director of the school and travelling lecturer he has to co-operate, not only with the several branches of the Agricultural Society of Rhenish Prussia, but also with the agricultural authorities and the school inspectors of his district, and to use every means to specially interest the latter in the school entrusted to his care.

He is expected to visit the burgomasters, the chief officials of the place, the clergy, the school-masters, and the principal landowners of his district, with a view to interesting them likewise in the school.

3. The question of the formation of a committee for each of the schools, consisting of the burgomaster of the place, the director, and certain other persons, who should conduct the administration of the business relations of the school, remains in abeyance until a more definite organization exists; it will, therefore, be for the director, in conjunction with the burgomaster, to see that the parish in question faithfully fulfils the obligations to which it has already pledged itself with regard to supporting the school. Irregularities in this respect, if they should frequently occur, are to be reported by the director to the president of the society, after he has conferred with the burgomaster upon the matter.

4. The director has to find efficient assistant masters, to transact all negotiations respecting their qualifications and remuneration, and to lay the proposed agreement with them in writing before the president for his approval.

5. The director, in conjunction with the assistant masters, is to draw up the special time-table for the coming winter term, and to present it at the proper time to the president for his approval. He is also to see that the agriculturists of the district receive due notice, through the local newspapers, of the beginning of each term, of the time and place for admission of new pupils, of the amount of school fees to be paid, of the arrangements for board and lodging in the place in question, and the subjects for instruction fixed for the ensuing term.

6. The director receives the regulation school fee of 20s.,\* and at the end of the school year he hands over to the treasurer of the Agricultural Society all that remains over and above the necessary expenditure, according to the school estimates (Sec. 7).

All applications for exemption from the school fee must be investigated by the director, in conjunction with the burgomaster of the place, and the results of the investigation must be laid before the president of the society.

7. When the winter session is over, some time during the month of April the director must lay before the president of the society the scheme of a detailed estimate for the institution in the coming school year, as well as the accounts for the year ended; the expenses incurred according to the approved estimate must be verified by vouchers. No excess of the estimate should be incurred without the previous sanction of the president.

8. An inventory is to be made of all articles obtained for permanent use; this is to be entered in a book to be at once provided for the purpose, and the folio and number are to be written on the corresponding bills. The director is responsible for everything in the school inventory, especially for everything connected with the instruction, and he will have to make good any damages occurring through carelessness or negligence.

9. The instruction will be given in accordance with the normal plan of study, drawn up by the managing committee for the travelling lecturers at its sitting of October the 10th, 1879; and in arranging the special time-table care is to be taken that the hours both of special and general instruction are as far as possible distributed equally among the days of the week, and that Saturday afternoon is free. The director has to take care that the instruction is regularly imparted in the auxiliary departments, and that it conforms exactly to the objects of the institution. No lessons may be omitted for any but the most exceptional reasons; and should the director from any urgent cause be obliged to absent himself he must at once inform the president of the society, apply for leave of absence, and provide a substitute. The director must see to the supervision of the pupils during the evening hours of preparation.

10. The director is expected to keep himself well informed respecting the latest improvements in the teaching of agriculture by studying the most important works on the subject. For the present the instruction in agriculture is to be founded on the "Leitfaden" by Martin; and natural science is to be taught from the elementary text-books published by Trübner, of Strasburg.

11. Towards the close of each course the director is to publish a report of the school in the form of a printed invitation to attend the compulsory final examination of the students, and copies of it are to be forwarded both to the president of the society and to the Governor of the Rhine Provinces in Düsseldorf.

The date of the final examination is to be duly notified by the general secretary to the society.

The director is also to issue special invitations to attend the examination to the district school inspector, the agricultural inspector of the district, the mayors and clergy, the members of the committee for the travelling lecturers, and the examining commission of the place, as well as the divisional directors of the school district. Parents and relations of the pupils are likewise admitted.

12. The President of the Agricultural Society for Rhenish Prussia has the right to have the school inspected whenever he pleases. On such occasions the director must be ready to furnish full information respecting the school; he must also note carefully any wishes of the inspector relative to the instruction, and make any improvements required.

Should the director fail to carry out any of the regulations issued directly or indirectly by the president he is subject, after having received two admonitions in writing, to a regulation fine not exceeding 50 marks.

*The Director as Agricultural Travelling Lecturer.*

During the months in which there is no school the director of the winter school spends his time as agricultural travelling lecturer in his school district.

\* When two brothers are at school together the school fee for each is reduced to 15s.

1. After having agreed with the president of the society and with the directors of the several divisions of his school district, he is to travel through the said district, to deliver his lectures, to study the existing agricultural conditions, to point out defects to those concerned, to explain their causes, and to specify the ways and means for their improvement.

He is to use his influence towards promoting the execution of such improvements, and to see that they are carried out.

He has to pay special attention to the aims which the individual farmers have each in view, and to the arrangements made for the attainment of this end, and to note whether aim and arrangement are suited to the circumstances. Further, he must direct his attention to the animals, their breeding and use, the number and fitness of the male animals, the manner of feeding, the stabling and the management of the manure heaps, the condition and extent of the arable land and pasturage in proportion to the live stock, the implements employed, and desirable additions, how far artificial manure is used, the draught animals, whether the available capital is sufficient, purchase and rent value per acre according to the quality of the soil, drainage, footpath, succession of crops, orchard management, horticulture, market-gardening, winter employment, and piece-work.

He must encourage parents to send their sons to the winter schools; during his journeys he must endeavour to visit young men who, having gone through their course of studies, have returned home, and encourage them in their work.

2. As in many instances individual means and powers are insufficient, he must point out to the small proprietors the advantages to be gained by intelligent co-operation, and must give all possible information about the establishment of loan societies, co-operative food-supply associations, societies for the insurance of live stock, vine-dressers' societies, agricultural clubs, &c.; he must point out how such institutions can and must be created by the farmers themselves, and the advantages that may accrue from them.

3. He must assist in controlling the proper application and observance of the conditions upon which the subsidies paid by the State and the society are granted, and for this purpose he will receive a list of the same from the secretary-general, and must state the result in his yearly report.

He must explain to the agricultural population the objects and usefulness of the institution, and the protection and advantages it offers, such as laboratories for chemical analyses and experiments, stations where bulls, boars, and stallions are to be found, cattle shows and prizes, institutions for the trial of machines and implements, agricultural clubs, exhibitions, &c., and encourage their participation in these organizations.

4. He must give theoretical and practical courses of instruction at the proper season on beehives and the proper rearing of bees, and on fruit trees and vines and their treatment, and also on agricultural book-keeping on a selected farm. He must appoint a stated time for these lectures, and issue a public invitation to all to attend them.

5. In his annual or in separate reports he is to make suggestions as to the means which should be adopted on the part of the society for encouraging such improvements as he shall have found to be necessary.

6. He must visit the existing agricultural schools and improvement clubs on his journeys, and register and report their condition, hold conferences with the directors, and use his influence towards the erection of new clubs.

7. He has to keep a diary of everything important that he has observed and done during his journeys, and include a statement of the same in his report to the president of the society.

The travelling lecturer is to have a month's holiday from the 15th of July to the 15th of August.

H. VON RATH,

President of the Agricultural Society of Rhenish Prussia.

Lauersfort, 24th November, 1879.

#### RULES FOR THE AGRICULTURAL WINTER SCHOOLS OF RHENISH PRUSSIA.

1. The pupils are required to attend during the hours of instruction and work. Exemption is granted only in exceptional cases by the director.

2. Cases of illness are to be at once reported to the director by parents in the case of their children, or by lodging-house keepers in the case of boarders, either verbally or in writing.

3. The pupils are to be punctual in their attendance, and at the ringing of the bell are to go at once to their respective places.

4. The pupils are expected to behave in a courteous and peaceable manner among themselves. Annoying one another is strictly forbidden, and redress in cases of injury or offence is afforded by the masters, and is not to be sought in any other quarter.

5. Each pupil is to provide the necessary books and writing and drawing materials, and to keep them in proper order.

6. Any pupil damaging the school property must make the same good, and should the offender escape undetected the expense incurred must be borne by the whole school.

7. The pupils must keep perfect silence and give their undivided attention during the time of instruction.

8. Regular attendance at church is required, as well as a conscientious observance of religious duties.

9. Non-resident pupils are not allowed to choose or to change their lodgings without the permission of the director.

10. The pupils are required strictly to observe the regulations of the lodging-house keepers, who on their part are earnestly requested to occupy the place of parents, and especially to report any misconduct to the director.

11. Pupils residing in hotels are strictly forbidden to frequent the public room.

12. Pupils are not allowed to frequent public-houses and beer-shops in the place where the school is situated.

13. Smoking is forbidden in and about the school and at the open-air lectures, as well as during the practical instruction.

14. Card-playing and all other playing for money is forbidden.
15. The pupils are expected to use their spare time not only in careful preparation of their school work, but also as far as possible in general self-improvement.
16. The pupils are to take care to conduct themselves in public with propriety, and to endeavour in every way to do credit to the school.
17. Non-attendance, unpunctuality, late return at the end of the vacation, misconduct, idleness, inattention, and disorder will be severally punished.
18. The various punishments consist of admonition, reprimand, entries in the class-book, detention on free afternoons, censure by the director, complaint by the director to the relatives, and finally expulsion from the school.
19. The director has power to exempt at his discretion certain pupils, according to their age and capacity, during a part or the whole of their school career, from the strict observance of the regulations contained in the foregoing paragraphs.

## APPENDIX H.

### FRANCE.

#### OFFICIAL EXPLANATION OF THE LAW RELATING TO THE ORGANISATION AND MANAGEMENT OF PRACTICAL SCHOOLS OF AGRICULTURE AND FARM SCHOOLS IN FRANCE.

To the Director of the Farm School of  
Sir,

Paris, 12th August, 1875.

The execution of the law of July 30th, 1875, on the practical elementary teaching of agriculture.

A law of the 30th of July, 1875, has just reorganised the practical elementary teaching of agriculture. While establishing schools of an intermediate grade between State schools and farm schools, the law has permitted these latter schools to remain, and has even given them a new departure. Whatever may have been the opinion which has been formed respecting the utility of the instruction they provided, such of the schools as have withstood the tests to which they have been submitted have exercised a real influence for good upon agricultural progress, and we have cause to be thankful to them for the services which they have rendered, not only by the example they have furnished of a model system of cultivation, but also for the instruction given by them to their pupils. But inasmuch as the old farm-school had no *raison d'être* in districts which were, from an agricultural point of view, most advanced, this type of school ought also to cease to be carried on under its original organisation in certain departments in which its work has been accomplished, and where it has prepared the way for an intermediate system of instruction which the legislation of 1875 was especially designed to provide.

Farm schools are recruited in a great measure from among the rural workmen, and this should be the case; for, on the one hand, the apprentices execute all the laborious work of cultivation which would otherwise have to be done by hired labour, and, on the other hand, the instruction does not there rise beyond the most elementary. The resources of these schools under this head are insufficient for young persons prepared to receive a more advanced education, such as the sons of farmers in easy circumstances, and of the small proprietors who are so numerous in our country. But while the farm schools cannot offer them what they have the right to demand, the state schools of agriculture are difficult of access, and too costly for a large number of people. Thus professional agricultural instruction of the high scientific character which is imparted in the state schools, and that having the exclusively practical direction which is maintained in the farm schools, are equally wide of the middle degree of education which would suit a large class of cultivators; precisely that class, in fact, which can contribute most powerfully to stimulate agricultural progress. The principal object of the law of the 30th of July, 1875, was to fill this gap.

The schools created in pursuance of the 1st Article of that law will, however, preserve a practical character.

The time in them will be divided into two nearly equal parts; the one devoted to a superior primary instruction, to which natural sciences and special courses will be added; the other being assigned to working on the farm. The teaching will not, however, be regulated in accordance with any uniform programme. On the contrary, the endeavour will be to render it appropriate to the cultural conditions of the different districts, and to make it, so to say, reflect the particular features of each. The same variety is also to be introduced in the programmes of the farm schools.

There can be no doubt that an instruction thus constituted must have a considerable influence in perfecting the methods employed in the cultivation of the soil; and it is much to be wished, also, that the sons of small cultivators, once provided with a good primary instruction, may have the desire to acquire such knowledge as is indispensable to an intelligent and reasonable practice of the profession which they will one day exercise.

If you consider, sir, that the time has arrived when you can advantageously transform your farm school into a practical school of agriculture, such as is defined by the law, my department will lose no time in considering the question, and will gladly give you its support, under these circumstances, before the general council of your department. Allow me to add that I earnestly look forward to the moment when this change may be effected, for I shall see therein the proof that progress has been realised in your neighbourhood.

In the meantime the farm schools will continue to be administered by the law of 3rd October, 1848, with the exception of some modifications which I am about to bring under your notice.

A committee of supervision will be instituted over each farm school. This committee will be composed of:—The inspector-general of the district as president, of a professor of science attached to an establishment for public instruction of the department, of three members of the general council elected yearly by that body, and lastly of two members chosen from among the principal agriculturists of the department. The member belonging to the teaching staff will fulfil the duties of secretary.

The functions of the committee are defined in the 9th Article of the law. Its duties will consist chiefly in considering the programme of instruction, and the attainments to be required from the candidates.

The



The immunity accorded by Article 11 to those holding the certificate of apprenticeship is such as to make it more sought after, and perhaps this will have the effect of attracting a larger number of young people to the farm-schools. The same Article 11 (s. 2) ordains that, in the case of apprentices entered after the promulgation of the law, the premium on departure (*prime de sortie*) should be withheld if they do not obtain the certificate for completion of studies. This provision is intended to extend the privilege which existed under the old state of things to the apprentices entered up to this date, notwithstanding the ministerial circular of the 23rd of February last.

The action of the committee of supervision will naturally take place on the occasion of the visits which they will make to the establishment for the various examinations. It is at this time especially that they will be able to ascertain if the programmes have been faithfully followed; if the results obtained show a good method, and testify to the solicitude of the masters on behalf of the pupils. It will also be possible for them to assure themselves, by the bearing of the young men, whether, by a firm yet paternal hand, the necessary discipline is maintained, and a wholesome moral influence is exerted over the farm school. But the committee will not interfere in the farming operations. The directors of the farm-schools conduct the farming at their own risk and cost; having the personal responsibility of their management, and it is essential that they should exercise their unbiassed judgment. If I should think it right to advise you further on this point, it will be to your interest to consider the same.

In order to preserve unity in the management, I should recommend the committee to show themselves very circumspect in offering direct opinions in their relations with you. They will record their remarks and criticisms, if there be any occasion for them, in an official report of their meetings, which will be transmitted to the authorities.

The pupils of the farm schools had not formerly the right to one year's voluntary service. This privilege is now acquired by those who obtain the certificate of apprenticeship. Nevertheless, this favour has not been accorded without conditions. Military exercises will be instituted in each farm school (Art. 7), and an officer of the army deputed by the minister of war will attend the final examinations. I shall have to consult with my honorable colleague on this subject, and I will forward to you special instructions as soon as I shall have decided upon the practical means of realising the prescriptions of the law.

It is part of the programme of farm schools to improve the primary instruction of apprentices. The 10th Article will permit them to have good masters whom they may borrow from the public instruction department without breaking their engagement with respect to military service. Several of your colleagues have expressed regret at different times that this power did not exist; you will now be able in future to entrust to a teacher the functions of a responsible superintendent.

Such are, sir, the explanations into which it has appeared necessary that I should enter to show precisely the spirit of the law of 30th July, 1875. The wise and benevolent provisions which it promulgates will, I hope, mark the beginning of a new era of prosperity in professional agricultural instruction.

I shall be obliged to you if you will be good enough to acknowledge the receipt of this letter.

Receive, sir, the assurance of my distinguished consideration.

The Minister of Agriculture and Commerce.

C. DE MEAUX.

For dispatch,  
The Director of Agriculture.

#### LAW RELATIVE TO THE DEPARTMENTAL AND COMMUNAL INSTRUCTION IN AGRICULTURE IN FRANCE.

The Senate and the Chamber of Deputies having adopted, the President of the Republic promulgates the law of which the text follows.

##### Article 1.

Within a period of six years following the promulgation of the present law, a chair of agriculture shall be established, in accordance with the following rules, in the department not already possessing this institution.

The programme of instruction shall include all branches of agricultural industry, and more specially the study of the methods of cultivation of the region.

##### Article 2.

The departmental professors of agriculture will be chosen by competition, and upon the report of a jury selected by the Minister of Agriculture, and constituted in the following manner:—

1. The inspector general of agriculture, president;
2. The inspector of the academy;
3. A professor of chemistry or physics;
4. A professor of natural sciences;

These two last examiners will be chosen from the teaching staff of the agricultural institute or of any agricultural school, and, in their default or absence, they must belong to the State university.

5. A professor of the veterinary college or of the nearest school of medicine, or a certificated veterinary surgeon.
6. Three agriculturists, chosen by the departmental commission from amongst the members of the agricultural associations of the department, who are nominated by each of these associations.
7. A councillor general, designated by his colleagues.

The professors of agriculture will be appointed by an order concerted between the Minister of Agriculture and the Minister of Public Instruction.

##### Article 3.

The competition will take place at the chief town of the department; the examination will turn upon the general principles of agriculture, vine-growing, arboriculture, and horticulture, and on the sciences in their application to the situation, the productions, and the climate of the department.



## Article 4.

The programme of the competition will be decided upon by the ministers of agriculture and public instruction, in accordance with the advice of the agricultural associations and the general council of the department.

## Article 5.

The candidates must (in order to be admitted to the competition) be Frenchmen, and be at least twenty-five years of age. If they can produce the diploma of bachelor of science, or that of the agricultural institute, or of any agricultural school, a certain number of marks fixed by the minister of agriculture will be allowed to them.

## Article 6.

The professors of agriculture must give lessons at the normal primary school (near to which they ought to reside, if this is possible), also at other establishments of public instruction where they are required, and they must give agricultural lectures in the different communes of the department to the teachers and agriculturists of the region.

## Article 7.

The salary of the departmental professor of agriculture will be paid from the funds of the budget of the ministry of agriculture and from those of the budget of the ministry of public instruction. The expenses of the journeys will be chargeable to the department.

## Article 8.

The functions, as also the dismissal, of the departmental professors of agriculture will be determined by public administrative enactment.

The order in question will determine the salary of the departmental professors.

It will also fix the minimum expenses of the journeys of the professors of agriculture with reference to each department, in accordance with the advice of the general council.

## Article 9.

The professors of agriculture already actually employed, whether they have been nominated after competition or not, will not have to undergo the test of a new competition.

## Article 10.

Three years after the complete organisation of agricultural instruction in normal primary schools, elementary instruction in agriculture will be included in the obligatory subjects of primary education.

In those departments, however, in which instruction in agriculture has already been organised at the normal primary school for more than three years, the departmental council of public instruction may decide whether this same instruction shall be compulsory in all the primary schools of the department.

The programmes of this instruction in each department will be drawn up after consultation with the departmental council of public instruction.

The present law, deliberated upon and adopted by the Senate and the Chamber of Deputies, will be executed as a law of the State.

Given at Paris, June 16th, 1879.

JULES GRÉVY,  
President of the Republic.  
The Minister of Agriculture and Commerce,  
P. TIRARD.

## APPENDIX I.

MR. PEARCE'S REPORT on the System of Art Teaching in the "Kunstgewerbe Museum und Schule" and "Kunst Schule." Plates XVII, XVIII, XIX, XX, and XXI.

BERLIN.

KÖNIGGEÄTZER-STRASSE.

THE Kunstgewerbe Museum and School in Berlin are in a large handsome building, the materials of which are brick and terra-cotta, in the style known as the "Hellenic Renaissance." It stands free, and has uninterrupted light on all sides. Plates XVII, XVIII, and XIX.

It contains a large Industrial Art Museum, and possesses school accommodation for 800 students.

The Museum is specially arranged to suit the trade requirements of Berlin.

The school is divided into day and night classes, but, as with us, most of the students attend both.

The students attending the night classes only do work of an elementary character.

The professors, masters, and teachers are forty in number, twenty for the day and twenty for the evening classes. They are appointed specially on account of their capabilities as teachers and their high attainments in the various departments of technical art they represent.

The whole system of instruction is under the superintendence of a director, whose word is absolute law, who is never interfered with in his professional work, and is responsible to the Minister only for the success of the school. The director of this school is also director for the schools which train the art masters and mistresses known as the *Kunstschulen*.

The school year is divided into two sessions, summer and winter. The fees for attending all classes during these sessions would be 72 marks, or £3 12s., for the summer session, and 36 marks, or £1 16s., for the winter session.

The school year consists of nine months, the remaining three months being spent by the pupils in working at their various trades.

The school and Museum, too, are largely supported by substantial yearly grants of money from the State.

The director can spend the money granted to the school in any manner he thinks suitable; generally it must go to the working expenses and in granting scholarships to deserving pupils.

Every

Every advantage is given to the pupils of the school to study in either the Museum or the library of the Museum. The Museum is under a director and two assistant directors. The school is essentially a Trade Art School, no pupils being allowed to study in it unless they are preparing to become trade designers.

Male and female students may attend the classes.

In the ordinary school classes the male and female pupils work together—a great advantage to both—the men work harder and play less, and the women talk less and profit by observing the stronger work of their associates. Owing to the number of drawings exacted from each pupil in a given time by the teacher, idle gossiping, loitering, &c., are avoided. Order and discipline are perfect in all the rooms from the fact of the great interest taken by the teachers in the work of their pupils.

In the studios of the professors men only work, except the one devoted to textiles, where the students are mostly women.

The hours of study are from 8.0 in the morning to 9.30 in the evening on all days of the week excepting Sundays, when the school closes at 12 o'clock noon.

All pupils on entering the schools work from Jacobsthal's copies. These are arranged in a most systematic manner, so as to allow of a gradual development of the student's power. The broad divisions are frets, mouldings, including the volutes of the Greek and Roman Ionic orders of architecture,—anthemions, scrolls, Renaissance ornament—principally Italian, and naturalistic foliage. These, again, are subdivided into frets,—single, double, and triple; mouldings, painted and sculptured; anthemions, of the single unit; then a combination, as on the hypotrachelium of the columns of the Erechtheum; and then flat combinations of several forming a design; Roman scrolls; Renaissance intarsia patterns, some copied from Meurer's examples of the choir stalls of the church of St. Maria in Orcagna, in Verona,—care being taken by the teacher to explain thoroughly the treatment of the acanthus foliation and the contrast between the work of this period and that of the Greek and Roman; then the more ornate style, where animal and figure forms are introduced; naturalistic foliage; flat treatment of such plants and shrubs as the acanthus and laurel; then sculptured treatments of the same.

After the second copy of Greek frets has been made, the pupil must do at home either a memory study of one of them, or a design combining the principles already learnt. Thus, at an early period, his future as a designer is kept in view. Prizes to a small amount are offered for the best drawings. Tinting, too, especially if the student intends to be a decorator or lithographer, is also insisted upon, and here could be seen a great advantage in commencing with the fret. The tint has to be laid on with one stroke of the brush, the various changes of direction of line enabling students to combat the difficulties of flat washing, and no retouching or stippling is allowed.

The intelligent pupil was not permitted to remain long in merely copying what was before him, but soon had to translate and adapt. Thus, the start of the ornament may be a shield, as at figure A, plate XX—the student is required to put a leaf or boss instead, as at A\*; the shape of the panel may be rectilinear, as at B,—the pupil is required to adapt the ornament to fill such a shape, as at B\*. The tinting, too, had to be done differently, and the harmony brought about by succession instead of contrast,—a subject previously explained by the teacher.

In this elementary room there were several pupils learning lettering, and, as they were lithographers or writing engravers, this study would be extremely useful to them.

The next step was to draw from simple casts, mostly of Renaissance details and special forms of ornament designed by the teacher, in a firm and vigorous outline,—some using the brush, others the charcoal and chalk point. Large casts, like the Madeleine and Louis XII. pilasters, were not allowed to be copied. All drawings had to be larger or smaller than the example. The student had to supply any defect in the cast, and could introduce slight shading if it assisted in giving the expression. Throughout the whole system of the work pupils were told to try and make the drawings "look nice," and for this reason good examples done by the teacher, or published under the direction of the director, treating the same or similar casts, were shown them.

Designs had to be done at home introducing the details learnt in the class, and the pupils were expected to show excellent *technique*, as well as judicious adaptation.

The work done in this department corresponded to our stage 3b, and was certainly nothing like so good in neatness of finish, excepting when done by special handicraftsmen,—for instance,—lithographers or engravers.

Shading from simple forms, such as prism and casts of high relief ornament, came next, corresponding to our stages 8a and 5b. These forms had been designed by the director and modelled and cast in the schools. Figs. 1, 2, 3, 4, and 5, plate XXI, represent some of the shapes and the order in which the pupil had to study them.

The shading throughout every department in the school is done on grey paper, the colour of the paper being used as the half-tone, the broad shades drawn with the stump, the dark shadows and high lights being then touched in with the chalk point and white chalk or Chinese white. The reason for using the tinted paper in preference to the white is this:—Tempera painting is largely done, the method adopted being,—1st, an uniform flat tint, equal in depth to the prevailing half-tone, is put over the whole drawing, the shades being then added, the deepest parts of the shadows and the brightest lights coming last.

If students are accustomed from the beginning to shade in this manner they are better able to overcome the difficulties in the more advanced work.

As will be seen from the illustrations, the objects and casts were simple in character, and great care was taken by the teacher to explain the broad planes of light and shade to the pupil, *e.g.*, the cylinder must be first studied as an object of many sides, where the gradations of tint are easily seen, and in shading even from the perfect sphere or cylinder the forms of such gradations are drawn first. This system was carried to a very advanced stage in all departments,—life, antique, and still-life painting.

There is no kind of work in the schools corresponding to our stages 6 and 7,\* which are with us practically obsolete.

Stage 8, with the necessary accompaniment of stage 9, forms the longest and most important period of study, all pupils, excepting the architectural, being compelled to pass through this course. The times of practice in these stages were so arranged as not to interfere with the daily work in the ateliers of the Professors,—

\* Stage 6. Drawing the human figure, and animals' forms, from flat examples.

Stage 7. Drawing flowers, foliage, and objects of natural history, from flat examples.

Professors,—thus the primary object of the “Kunstgewerbe Schule” was not lost sight of. Continuous daily or weekly study in either an antique or life room would not be allowed. The times of study were—

Antique	...	...	...	...	...	...	...	4 to 7
Life	...	...	...	...	...	...	...	7 to 9:30

on four days in the week, the fifth being devoted to anatomy—both lecture and practice.

In the atelier for figure decoration, a living model,—generally female,—would be posed, and rapid time sketches made to be afterwards adapted to a design; but this was the only exception to the general rule forbidding figure drawing between the regular working hours of 8 to 4.

In stage 8b the model of the cast, in planes only, was placed by the side of the finished example, so that the student could comprehend the largeness of surface, a useful plan for decorators who do not carry on figure study to an advanced point. The shading, as before stated, was done on grey paper. The general result obtained from most of the drawings by the pupils is an exact imitation of plane and firm outline, but at the same time a general character of conventionality.

From the life model—always male—in the general class room the highest credit was given for the study treated in a large manner and best expressing the action and pose. When the drawing was unusually good, the teacher suggested an adaptation of the figure to a design, the study being placed side by side with the adaptation when submitted to the director. Some of the students worked in outline only, in the style of Dürer, others on grey paper.

Before pupils began their drawings the teacher gave a capital lesson upon the proportion, pose, and character of the model, illustrating his remarks on the blackboard. Where the long bones of the limbs were subcutaneous, special reference would be made to the form in these parts.

The accommodation in this life-room was excellent, more than 40 students being able to get a good view of the model, and as the seats and stands were fixed, no time was lost—as with us—in the unnecessary arranging of places every time there is a different model.

The model sat for four nights only. The poses were excellent. A cast of a figure from the life, excepting the head, is sometimes placed in a position for pupils to draw instead of the living model.

One day in each week, after 4 o'clock, is devoted to the study of anatomy. The room used was the same as that devoted to study from the life. Lectures were given, and in this order, bones, ligaments, muscles, and tendons, surface forms,—their causes, &c. Between the lectures pupils are obliged to prepare a series of drawings to submit them upon the evening of the lecture to the teacher.

Life-size drawings with the lengths of the principal long bones of the extremities and groups of bones marked, were drawn in oil colour upon a blackboard in three positions, front, side, and back. The teacher explained from these drawings and the skeleton, pupils making notes especially of the character of the bones, from an artistic point of view, and their subcutaneous parts. All the drawings are done life size from actual measurement of the bones.

In teaching the muscles the pupils had to come with drawings inked in similar to those upon the blackboard, and to a proportionate scale. The teacher explained the origin, insertion, and use of muscle, then made a drawing of it upon the blackboard in red chalk over the bones previously drawn there, the pupil carefully following upon his own drawing. This seems to be an excellent method, and the students greatly profited by it as their life studies testified.

Studies, full size, from casts of muscles and large diagrams designed by Professor Ewald had to be made in the intervals of the lectures, most of the men devoting Sunday mornings to this purpose.

Lectures on advanced perspective (most of the pupils, if not all, learn the elementary principles of perspective in the “Fortbildung” schools) were given, the method adopted being similar to the one used by architects.

All students must attend this course either before or after, generally before, the anatomical, but must not do the two together.

Architects, furniture designers, iron workers, figure decorators were expected to enter upon this course most thoroughly, and no objection was raised to the ordinary day-work being given over in the atelier, and this taking its place, so important was it considered.

The course consisted of some twenty lectures, and large objects and subjects, sideboards, bookcases, interior of a room, flight of steps, arches, &c., were drawn in perspective, our small objects being strongly condemned as being unpractical. The drawings were always done to scale, and the advanced students often made measurement drawings of suitable subjects selected by the professor, thus the student comprehended the actual shape and the appearance of the object at the same time. Surprise was expressed at our adopting a method that could never be applied to a large subject, and which made prisms, cylinders, cones, &c., 12 feet long and 10 feet diameter, dimensions of a gigantic character, and never seen in reality.

Sciography formed a portion of this course, and was most excellently taught. Modellers and applied relief designers, decorators and architects made very elaborate studies in this department. The tinting is done in a series of flat washes, commencing with the lightest, no softening with a water brush being allowed. The gradation of rounded forms is expressed by a series of flat washes, the greatest care being taken by the teacher to explain the true shape of the most subtle tint either on a sphere or vase. Excellent models afforded pupils every possible chance of thoroughly understanding this subject.

If pupils had not determined their trade before entering the schools they were permitted to study for two years, at the end of that time were compelled to inform the director as to their choice. No pupil is allowed to remain longer than this period without making known his or her decision. Should the pupil wish to be trained as an artist or sculptor instead of a designer for trade purposes after this preliminary course of study, he or she was at once requested to leave and join the Academy Schools. The line of demarcation between a school of fine or painting art and a school to train designers was always firmly marked. In addition to the subjects already mentioned, these pupils necessarily younger than those in the ateliers painted in sepia and made studies from groups of still-life. These studies, especially the sepia, were of large size, and painted in a manner suitable for decorative purposes. The still-life groups were arranged as compositions in colour, but on purely decorative principles, *e.g.*, in festoons from one and two points of support, and were most useful for means of reference to the student in his or her subsequent career. Some painted in oil, but the greatest number used water-colour, and a few, especially clever pupils, tempera. Directness of aim and precision of touch were the primary considerations in the technique, and no retouching or stippling was allowed. All the studies in this, as with the other departments, were timed.

Every

Every study made in the schools proper, that is, not in any of the professors' ateliers, had to be submitted to the director, who had an opportunity of regulating the whole of the school teaching. Marks were given, and at the end of the school year added into one total to tell in favour or otherwise of the student should he or she apply for a scholarship. When a high standard is reached, and consequently a large number of marks gained, scholarships to the value of 75 marks a month (equivalent to £48 a year) are granted. Pupils, besides showing decided ability in design, must also be comparatively poor to earn these scholarships.

Lectures upon the principles of design and the history of art in its reference to industry were given, and most of the students were requested to attend. They are given annually, and the course seems to extend only for one year, so as not to compel a student to spend more than that time in attending them.

The lectures upon the history of art given by Professor Lessing were of a most practical character. His system was to take a feature of decorative art, *e.g.*, panels, divide them into kinds, shapes, and chronological groups, illustrating the lecture by photographs, printed examples, and admirable drawings on the board. Quattro-cento, cinque-cento, and the purer portion of the Baroque styles came in for a large share of attention, the last-named style because many firms in Berlin and Dresden had somewhat revived it.

One noticeable feature at these lectures was the excellent manner in which the pupils took notes of the drawings and remarks of the teachers.

After each lecture these notes had to be submitted for inspection.

The most important element and, no doubt, the principal cause of success of the wedding of art to trade in Germany by the Kunstgewerbe schools lies in having technical professors, the best in the country, to teach in the schools. These professors are men of recognized ability in the several departments of trade art, architects, engineers, ornamental and figure decorators, modellers, &c., well known throughout the country as being at the head of their several professions, and are thus able not only to give thorough practical teaching, but to assist in getting employment for their pupils. Generally their experience in the matter of design has not been confined to a knowledge of German art, but from a large acquaintance, by the means of personal study extending over several years, of similar work in France and Italy. Their salaries range from £150 to £300 a year, according to the importance of the subject taught. A splendid studio, with appropriate fittings (*see plans*) for private work, and an adjoining atelier for pupils are also given them. They are supposed to be present daily. The director holds them responsible for the pupils' work, though he does not in any way interfere, and it may happen that the whole time of the pupil is occupied by doing private work of the professor, providing the director's approval has been previously obtained. Employment is always found for the pupil during the three months' vacation by either the professor or his personal influence with the manufacturers, or the manufacturers applying to the school, or by the director; and the careful pupil is able to provide sufficient money during this period of practical work to keep him the remaining months of the year, supposing he is not in receipt of scholarship allowance. In the vacation of the year 1884 the pupils of Professor Schaller were occupied in assisting him in the decoration of the theatre at Leipsic; the year previous the advanced ones were sent to Verona to copy some frescoes, also for the professor.

The instances, unfortunately so very common in our own country, of seeing the skilled and trained designer, after being educated in the Government schools, not able to get employment and obliged to turn to picture painting, are unknown.

#### *Architectural Atelier.*

The system here adopted was to train the pupil into excellence of technical work first, designing to come after a perfect mastery of the pen and brush as far as these implements are necessary to the architect. Most exact studies of the orders were therefore done as preliminary work to the measurement drawings and designs. These orders were drawn, as is usually the case, in orthographic projection to a scale of metres and modules, but in all cases perspective drawings showing the position of the order in the whole building had to be shown. Important details, such as the capital, base, and cornice, had to be drawn *full size*. The pupil then would be able to form a thoroughly good idea of the practical portion of his work in this stage of study.

The measurement drawings (corresponding to our stage 23a) were taken from models made to scale of a recognized building. One model of the Parthenon was most splendid, as it could be taken to pieces, and its construction perfectly understood even to the details of the tiles, method of stone jointing, roof construction, &c. No expense was spared to make this study of a thoroughly comprehensive character, so that the student would learn construction and design together. Upon the same plan as the Parthenon were Classic and Renaissance doorways, window openings, and models of ceilings (also used in the ateliers of the decorative artists), besides modern buildings.

None of the finished drawings can compare pictorially for excellence of finish or truthful rendering of local colour to those done in our schools under Mr. Haggren. A practical looking drawing was all that the teacher required. The shadows, in fact all shading, were expressed in lines, not in tint, for the reason of better reproduction in printing.

Pupils wishing to become furniture designers worked in this atelier. These were required to make, first, one or two careful drawings to scale of some existing examples considered by the teacher to be good. After this they were requested to make use of their own designs, doing firstly, a sketch to scale of the whole; secondly, detail drawings, full size, of the most important features; thirdly and lastly, a finished perspective drawing with the shadows projected, and, in some cases, the tinting of the various woods.

Designers for ironwork also spent some time in this atelier, their course of study resembling that of the furniture designers, only slightly modified to suit their special craft.

It was considered highly important to have trades closely connected with architecture taught by an architect, the same principle was carried out in the modelling department, all the modellers being taught by one of the leading Berlin architectural sculptors.

#### *Ateliers for teaching Decorative Art.*

Pupils to be trained for decorative artists were divided into two divisions, those painting ornament with little or no figure decoration combined with it, and those who principally painted the figure. Each division had a separate atelier and professor. The pupils to be trained for figure work were selected from the best of those painting ornament. All the painting was done in tempera. The pupil entering the  
ornament

ornament room had to work in the following systematic manner. First, paint an architectural moulding, e.g., the echinus, then a cast generally of cinque-cento ornament, both in monochrome, then copy in colour a study by the professor. The representation of the white plaster was admirably given. The studies were generally done on white cartridge paper, or a fine canvas, strained like ordinary prepared canvas for oil painting, on stretchers, so that the underside could be easily damped. The teacher had prepared a series of tints, seven in number, which he considered necessary for a pupil to use in painting a white cast. These tints had to be matched, and a sufficient quantity of the colour mixed up before the pupil was allowed to commence his finished work. All the painting had to be done whilst the paper or canvas was damp and at one painting. No retouching was permitted. The tempera medium called "casein" was made up of the following ingredients:—

*Six eggs, the white only.*

*Gum tragacanth, dissolved in hot water, two or three table-spoonsfuls.*

*White wine vinegar, half as much as the two previous compounds amount to.*

*A few drops of thick turpentine.*

*Curd soap, to the amount of two or three table-spoonsfuls dissolved in hot water.*

In colouring large surfaces size was recommended to be mixed with the colours.

The brushes used were hog hair and lion hair, the latter taking the place of our camel or sable hair.

After making a good copy from one of the professor's own studies (a study of a dead peacock, about 5 feet x 3 feet 6 inches, was a favourite), the pupil joined three or four others, and made a study in colour of the ornament of a white plaster cast, say, a panel or pilaster or portion of a frieze, generally Renaissance ornament. He was allowed to use what colours he liked, but must first submit, for approval, a small sketch showing the general scheme. In teaching the principles of colouring, the professor laid great stress upon the harmony to be brought about by "verwandt," "co-relative succession," instead of "contrast," and to support his teaching had a series of most splendid-tinted measurement drawings of good decoration done by him in the holidays in Venice, Paris, Verona, Vicenza, and other cities.

Every study done by the pupil had to be worked to scale and done larger or smaller than the cast.

About a week was allowed for this study, and after completing it to the teacher's satisfaction the pupil was required to make his first attempt at design. Suppose it were a panel he had been copying, he would be required to design a similar one harmonising in form and colour to be viewed at the same height, and then, perhaps a frieze to harmonise in a similar manner with the two, but to be viewed from a much higher position, or a stencil pattern to agree both as to scale and colour with the panel, or suppose rather naturalistic ornament, say the egg and pomegranate portion of the frieze of the architrave of the Ghiberti gates had been done, this was to be regarded as a frieze in a dining-room, and a body and dado of wall to be designed to harmonise with it.

The technical work was all that could be desired, and the greatest finished was insisted upon.

The professor had a very large business connection in Berlin and throughout Germany generally, so he was able to find employment for, often, as many as twenty of his pupils to assist him in fulfilling his orders.

Flowers, fruit, dead game, &c., were copied not so much as objects of still life, but as suitable details for decoration. The professor insisted upon a careful imitative study of the object first, and then required a good adaptation to a design, the pupil submitting the sketch from the actual object side by side with the design.

The pupils in this, as in all the ateliers in the school, had to submit once a month a design to the director who adjudicated marks. These marks told greatly in favour of pupils when applying for scholarships. Money prizes were also given to the first and second best studies in the several departments. These sketches were on view in the schools for a few days and were publicly criticised (*see plan for rooms in which these sketches were exhibited*). The director gave out the subject a week before sending in, and wished the work to be done entirely at home.

About fifty pupils worked in this atelier.

#### *Atelier for teaching the Figure as applied to Decorative Art.*

About twenty pupils worked in this room.

Splendid casts of details of human and animal forms from the life and antique specially obtained and arranged by the professor were used by the pupils. Only on special occasions did the model sit, and then for not more than two days. Most of the time when the model was present was occupied by demonstrations upon the black-board by the professor illustrating composition of line, proportion, &c.

The best pupil was selected from the class to work in the atelier of the professor.

The work going on was specially adapted to trade requirements. The senior pupils mostly executed orders sent either to the director or their professor, and were allowed to receive payment for them.

Imitation of the surfaces of various materials was carried to a high point of attainment, being considered very necessary to the decorator. It was surprising to see how well armour, textiles of various degrees of thickness, different kinds of wood, &c., would be represented with simple pigments and on grey paper.

The method recommended by the professor for painting, and the one universally adopted it is said in the "Kunstgewerbe" schools in Germany, was to first mix up a tint answering to the prevailing half-tone of the object to be copied and paint first. Whilst this was wet the shade must be painted over it, also the light half-tone, then the reflections in the shade, and, lastly, the high light, taking care not to allow the paper or canvas to dry during the painting of one part over the other.

#### *Atelier for Chasing and Engraving.*

Pupils copied first in a firm, clear outline, without any attempt at expressing light and shade in line, good examples of chiselled and engraved work, making the drawing larger than the original. The examples were either chosen from the works of "*Les petits Maîtres*," or good modern specimens.

When the teacher was satisfied that the pupil could draw with ease a firm, clear line, he gave them to copy on a piece of copper or other metal a good bit of modern work, splendid specimens of such having been presented to the schools by the leading manufacturing firms of Germany.

When this had been done well he was requested to make a design, first, on paper to be approved by the teacher, and then to do the same on copper.

Many

Many of the drawings upon the metal were most splendid for technical excellence. Of necessity they took a long time to do.

Very little *repousse* work was carried on in this school, but in Dresden and Munich it appears to take the place of engraving.

#### *Atelier for Copper-plate Engraving and Etching.*

The copper-plate engraving was of a semi-pictorial character, and so adapted for trade circulars, business cards, small advertisements, &c. The ornament was generally of a lively character and interspersed with figures.

Etching was much the same as with us, only more elaborately finished as to the rendering of conventional textures. The best objects in the museum were copied by the senior pupils, the more elementary confining themselves to copying works of their professor.

#### *Atelier for "Kunst Stickerei."*

"Kunst Stickerei" is a generic expression, and is applied to the decoration of textile fabrics generally meaning rather more than our "Art Needlework." With a few exceptions all the pupils were women. The principal teacher was a woman.

Pupils were trained to become designers for lace, embroidery, silk hangings, carpets, and furniture decoration, answering to the work generally done by an upholsterer. There were about 350 pupils in the various rooms devoted to these several studies. A girl was supposed to draw fairly well from the cast (Stages 3b, 5b, and 8c) before being allowed to settle into regular design work. Broadly speaking, the course she would have to go through before following the special branch of design she desired to adopt would take about a year. Another six months would be spent in doing preparatory work, copying old designs, understanding the *technique* of her adopted trade, &c., and then she would commence to design upon her own account. As a rule, after two years' study in the schools, the majority were able to earn their own living. Manufacturers were only too glad to buy the designs done in any department of the schools, but especially those produced in these rooms. This was probably owing to the greater demand for them from the public.

Specimens of designs, the actual material, photographs, &c., were placed upon the walls for reference, but besides these at any time a pupil could procure for special study any object or objects in the museum, retaining such for any length of time, a great boon to the anxious student. A similar plan to this was adopted in Dresden, with the addition that the pupil could take the object home to study in leisure time. The director of the museum has never known of a single case of loss or damage.

A great many designs, of course all those for carpets, were done on squared paper.

The lace designs were for hand-made only, the machine-made being condemned. Generally speaking, designs for machine-made work were not allowed to be done, perhaps for the reason that owing to the inferiority of German machinery they could not be successfully carried out; this may be an advantage to art, however, instead of a disadvantage.

Paintings on silk are largely done, the technical skill exercised in the painting being most commendable.

#### *Atelier for Modelling.*

The rooms were very large in the basement because of the convenience afforded of keeping clay damp, easy transit of large models, &c.

The lighting was extremely good.

Nearly 100 pupils learnt the various branches of modelling.

The class was divided into two broad divisions—those who intended to be architectural sculptors, monumental masons, &c., and those studying to become designers for gold and silver smiths' work. The first worked in clay, the second in wax on slates on wooden models.

The workers in clay first copied, either larger or smaller, never the same size, parts of good Classic or Renaissance casts of ornament. On no account whatever were they allowed to attempt the whole cast. The teacher contended that what the pupil requires is to know the principles regulating the construction of ornament, to be obtained from the lectures, and a thorough knowledge of the best details. Quattro and cinque-cento Italian ornament seemed to be the favourite periods.

When classes are crowded, as is the case with this one, the plan of attempting a portion of the cast enabled several students to work from the one example.

After working from a cast the pupil was required to make an enlarged study of an important detail from a photograph, generally of Italian ornament; here again only a portion had to be done.

After ornament came details of the figure from the Antique, Renaissance, good modern examples, or the life. Only parts of the figure were modelled, and it would be most exceptional for either the whole antique or life figure to be attempted.

In one or two instances during a session the life model may be posed for a lecture, and a quick time sketch made, but a design had to be done at once with the figure forming an important feature, both being submitted to the director.

Drapery was largely studied. Silk was used as the material to form the folds, as the teacher considered it specially adapted for working in clay or wax. If it were impossible to arrange the drapery in the position required in the design the nearest attempt at so doing was done first, and then the required adaptation made from this preliminary study.

Ribbon forms were studied from shavings. The training of designers for gold and silver smiths' work was something similar to that adopted for the sculptors, but the examples to be copied were more modern, and the scale of the work much smaller.

The manipulation of the clay and wax was exceedingly good.

Advanced pupils worked in stone and executed orders for various firms in Berlin, and in some instances in London. To explain to them the manipulation modern examples of good work were shown them.

A number of the designs executed as orders were modelled in the playful style of the Rococo, owing to the great demand for such work at the present time in Germany.

The



The plans of the museum and school are attached.

The German scale of metres and the comparative scale of English feet are marked upon the drawing.

The arrangements for cloak-room accommodation, such as the placing of hats, coats, cloaks, umbrellas, &c., are in each class-room.

### KUNST SCHULE.

SCHOOL FOR THE TRAINING OF MALE AND FEMALE ART TEACHERS TO INSTRUCT IN THE GOVERNMENT SCHOOLS.

THE whole system of teaching is adapted for the training of teachers, none but those intending to follow this branch of art being allowed to attend.

#### *Elementary Room.*

The teacher in training must first enter the elementary room to pursue the following course of study. To copy from the black-board capitally drawn diagrams, illustrating the principles of ornamental construction somewhat answering to our stage 2*b*, only the studies are not made from flat examples. All construction lines had to be most carefully marked. This course was a progressive one, straight lines and simple curves first, these developing into the most advanced ornament in a somewhat similar order to that in Dyce's book. When two or three sheets had been well done the same drawings had to be drawn before the teacher upon the black-board, with verbal explanation of how a class would be taught. Each pupil is required to submit for approval to the director some eight or twelve drawings executed during his or her stay in this room. The time usually spent over this preparatory course is from four to six weeks.

After leaving this room they draw from models and casts of ornament, stage 5. Pupils must make studies not so much in an imitative manner as one that is profitable to teachers, who at times are often called upon to correct a drawing away from the cast. This idea is also carried out in the Kunstgewerbe Schules in Dresden and Munich.

Should there exist any defects in the casts, broken serrations of leaves, &c., the pupil must not copy them, but give a restored rendering of the part.

The casts were the same as those used in the Kunstgewerbe Schule, and made upon the school premises. Many good modern casts are in use both in this stage and that answering to our 8*b*<sup>1</sup>.

In the latter stage the director considered that pupils who were in training as teachers learnt more of the actual form of eyes, noses, mouths, ears, and other details of the figure from very good modern examples than from the antique.

Interesting models of hands and feet, in planes only, showing slightly exaggerated treatments of subcutaneous parts, a head upon a pivot with lines drawn through the eyes, mouth, nose, &c., to illustrate the principles of construction, the pupil is required to draw, besides giving a lecture before the director upon the object.

Drawing leaves, flowers, fruit in outline, resembling stage 10, and shading came next. The study of botany had to accompany this drawing from nature in the same way as anatomy did that of the figure.

The pupils worked in large classes, groups of eight or nine working from the one group of models or cast.

They are expected in their own schools to always teach in classes; individual teaching so common with us is unknown.

Geometrical and perspective drawing were taught, but in such an elaborate manner as could only be used in schools of a most advanced character. A model used for orthographic and perspective projection, and which all teachers of these subjects must demonstrate from, was one of the best that could be made, and extremely useful.

The advanced pupils had to attend a series of lectures upon architecture by a leading Berlin architect.

Seeman's History of Art was the text-book, and every third pupil attending the lecture was supplied for his and his fellow pupils' use three or more plates referring to the history or period intended to be explained by the teacher.

Supplying these plates is one among many helps given to students, though it must be extremely expensive to the Government.

No design was taught, and the ordinary school teacher was not expected to know very much about this subject.

The principles of colouring had to be understood, but only from diagrams. Owen Jones' method is not approved of, and teachers are not expected to teach any of the principles that he lays down in his Grammar of Ornament.

There is a most useful library belonging to the school, with a copying room adjoining. About 100 students could be easily accommodated in these rooms.

The course of instruction is entirely in the hands of one man, the director, who sees every drawing and marks it and grants diplomas of efficiency when he considers the would-be teacher is capable of teaching upon his or her own account.

The time spent in the school varies according to the ability of the pupil, but the average time seems to be about three years.

Before being allowed to enter any classes in the school all the male pupils must have passed very severe examinations in general knowledge, equivalent to the matriculation examination to the university student, which carried with it the privilege of serving only one year in the German army instead of the usual three.

The number of pupils attending all classes is nearly 500.

The building is very large, and affords ample accommodation.

As in the "Kunstgewerbe" School, the staff of masters and mistresses is a very large one. Scholarships are largely given to help specially deserving pupils.

Often it may happen that a provincial town will send a promising pupil for even so short a time as three months to profit by the instruction and advantages offered by this school.

## APPENDIX K.

USES, OBJECTS, AND METHODS OF TECHNICAL EDUCATION IN ELEMENTARY SCHOOLS.  
BY HENRY H. CUNYNGHAME.

No apology is needed for bringing to the notice of a society founded for the purpose of encouraging the arts and manufactures a subject so important as the education of our mechanics and artisans.

A generation has not yet passed away since the necessity of educating the masses of the people was recognised, and only some fifteen years have elapsed since the subject was undertaken in earnest. Though England was late to begin, as compared with foreign nations, yet her progress in this respect has been surprisingly rapid, and bids fair shortly to place her in possession of a system of schools in no way inferior to those on the continent of Europe or America.

But an opinion is steadily growing up, and every day finding more adherents, that our elementary training, whether for rich or poor, is still incomplete, and that it will not become fitted to the wants of the time until it has undergone some grave modifications. For, since the framework of our educational system was put together in the Middle Ages, great modifications have taken place in modes of thought. The criterion of truth is no longer the voice of authority; the schoolmaster must, therefore, modify his system. He has no longer a right to require the assent of his pupils by a mere *ipse dixit*. His true province is now to teach his class how to observe, and how to experiment and learn of Nature for themselves, rather than to supply them with an encyclopædia of facts, supported only by the voice of authority.

In the universities this change of system is silently but rapidly progressing; science laboratories are rising up everywhere for the experimental method of study, and mathematicians, imitating the example of men like Newton, Gauss, Pascal, Clerk Maxwell, or Sir W. Thomson, are going to experiment for the basis of their theories, instead of for ever proceeding by a deductive method based upon a series of unverified assumptions. So that it is no uncommon sight to see a senior wrangler in the physical laboratory.

Even classics, the former stronghold of didactic teaching, is taking the same line. Visits are made to Greece, and scholarships awarded to enable Egyptologists to study upon the spot; and thus understood, classics, instead of being confined to an imitation of the styles of ancient authors, is becoming expanded over the whole field of ancient philosophy, history, and art, and therefore glows with a life, a truth, and a reality that it never previously possessed.

In the great public schools, too, the same influence is spreading; laboratories are being constructed, presided over, not as before by the nearest country medical practitioner, but by men who have regularly taken their degrees in chemistry and physics. There are botanical and entomological clubs, and in the corners of the play-ground carpenters' shops are being erected.

These shops are, it is true, not yet on a satisfactory footing. Patronised with perhaps a shade of contempt by the classical master, they are often left to the mercies of some superannuated carpenter, who has never received any sort of scientific education. This neglect, perhaps, proceeds from the entire ignorance that the whole of the principles of geometry and mechanics can be learned in a carpenter's shop, with pieces of wood, nails, and string, in a manner in which they can never be acquired in the class-room.

Not for a moment is it intended here to deprecate the use of high mathematics, but the principle of virtual velocities, or the conservation of energy is not half so vivid and real to a boy who has never gone beyond paper work as it is to one who has been allowed to construct a wooden scale-beam, or been permitted to handle even a home-made gyroscope.

Little children have nearly solved the question for themselves, by refusing to learn except through the eye and hand, and for them the Kindergarten system, when properly used, serves as a method of experimental education.

Our Board schools have very properly been framed after the model of our best public schools, and will, therefore, probably have to follow in their wake. For if some sort of experiment has been found beneficial in the case of those who are to follow learned professions, how much more valuable must it be to the artisan?

Moreover, other influences are at work, making the need of it still more imperative. Up to the present century industries were secrets, they were the property of cliques and classes, they were mostly carried on on a small scale, and the workmen, as well as the industries, were localised in centres, often fixed for them by political considerations, but from which it was very difficult to move. But printing has almost destroyed the secrets of industries. The growth of ideas is destroying trade corporations and privileges. The invention of machinery has diminished small factories; and the railway, while it has increased the localization of various trades, has enabled the population of artisans to flow freely from one place to another. An thus, in less than a century, the whole industrial system of the country has been revolutionised and reconstructed.

This reconstruction has its good and bad sides. Manufactured articles of all kinds are incredibly cheaper than they used to be (regard being had to the change in value of the money-standard). Moreover, there is, for all who choose, far greater chance to enter the class of skilled artisans. But, on the other hand, the mechanic is kept week after week, and year after year, at the same monotonous employment; and specialisation of labour pushed over-far tends to the degradation of the workman, and the diminution of the art-value of his work.

This evil produces the result that although the entry into any trade is more easily open to a mechanic, yet education in his craft becomes more and more difficult, and it becomes more and more hard for him to "rise from the ranks;" and in all trades in which individual skill, adaptability, and thought are required, complaints are increasing that the skilled workman will soon disappear.

Under the old system, apprenticeship was the only road to learn a trade. A picture of it has been preserved to us by the pencil of Hogarth. The apprentice paid a fee for instruction, and received his board and lodging as an equivalent for his work. If idle, his master corrected him; if he ran away, his chance of employment elsewhere was very small. The master who took an apprentice often gained a friend, a future partner, and perhaps a son-in-law. There was then every inducement for a master to teach his apprentice, and accordingly apprentices were carefully instructed. There were abundant numbers of good artificers in proportion to the demand for their work. The old watches of 100 years ago show such exquisite taste and skill in the mere embellishment of the interior, that the balance-spring covers were models of art-engraving. Thousands of those old watches have been recently broken up in order to turn these covers into ladies' necklaces, the brass being covered with a thick coat of electro-gilding, a fact which reflects anything but credit upon the state of the jeweller's art at present.

The



The apprenticeship system is now on the decline; this is due to three causes. In the first place, the apprentice rarely boards with his master—the factory system has rendered that impossible, and increased means of locomotion have raised the number of apprentices who live with their parents. In the next place, society is now so large, and trades are so scattered, that an apprentice can easily run away from one master and enter the service of another; so that it is hardly worth while for a master to expend pains in teaching him his trade. Moreover, the factory system creates a demand for half-educated lads, and by offering wages which appear high to boys of 18, induces them to leave their masters just when they are learning most, and on the way to become accomplished masters of their craft. The result is, that formal indentures are now becoming rarer, and boys generally commence to learn a business by entering a shop at 5s. a week, which is an insufficient equivalent for the board and lodging that was once afforded them.

There are other causes which also operate in the same direction. In the factory no provision is made for teaching; the master chiefly desires human machines. If he develops skill in a boy, he will soon be met with a demand for higher wages, or a threat to leave and carry away some of the secrets of the workshop. It is, therefore, rarely the interest of masters to do much towards teaching apprentices.

On the other hand, the men have a direct interest in doing still less; for each apprentice, when taught, becomes a rival, whose competition aids in lowering wages. Therefore, we find that trades' unions and societies, so far from facilitating the teaching of apprentices, frequently try and limit their numbers.

The sole idea of parents is too often to get the boy to bring home as much money as he can to help the household, and consequently when the question arises whether he shall go on at a low wage in the place where he is really learning, or leave it in order to obtain a higher wage at a place where his instruction will no longer be progressive, every home influence is exerted to induce him to take the latter course, to the ruin of his career as a skilled artisan. And, lastly, the boy himself has rarely, at the age of 19 or 20, sufficient judgment to resist the alluring prospect of earning 20s. or 25s. a week, and being enabled to marry and have a home of his own.

It is easier to point out these difficulties than to see how they are to be remedied. In part, no doubt, they will remedy themselves; for every year the industries of Great Britain take a more artistic direction. But true artistic work can never be done by machinery. The greater part of the subtle charm which an artistic object presents is the impress of the mind of the artist. This tendency, then, of the industry of England to develop in an artistic direction can hardly fail to be of benefit to the artisan.

But still, comparing the immense relative progress made by France and Germany in the art and industrial education of their workmen with the slower progress of England in that direction, there can be no doubt that much requires to be done in this country. Moreover, an inquiry into the causes of the great increase of manufactures on the Continent during the last half century will show that this increase has been, to a considerable extent, due to good artisan education, and will prove that money expended upon technical education will be a profitable investment.

When once it has been decided that technical education is needful for the artisan, it becomes at once important to determine what the nature of it shall be; for, after distinguishing it from purely literary or scientific or art education, it may still be either of a theoretical or practical kind. It may merely endeavour to teach the workman how to apply scientific principles in the execution of his work, or else it may go far beyond this, and endeavour to educate him in manual dexterity. Now, for each of these two kinds of technical teaching there is a proper place. The technical school is the place to learn the application of theoretical and scientific principles to industry, but technical dexterity can only be acquired in the workshop; and the boundary of them not being always very easy to define, all the more care is needed that neither of these shall include on the functions of the other.

There is little danger that the workshop will ever become too theoretical, but there is great danger that the technical school may entirely miss its mark, by stepping out of its proper position and trying to become a workshop; and there is also great danger that the attractions of the technical school may blind us to the fact that no technical school can ever efficiently replace the workshop.

The barrister is formed at the law courts and in chambers, not in the lecture-room; the doctor by walking the hospitals, not in the study; and the engineer and mechanic must follow the course. For the generality of men trained purely in the laboratory will never learn to deal with the difficulties of life in the world of practice so well as those who have been brought up face to face with it.

Moreover, it must be remembered that no technical school can possibly acquire all the plant and machinery necessary to teach various trades, and to keep constantly up to date in improvement; and, further, that even if it could, it is impossible to see how a whole population of boys could be fed and clothed while they were learning. For the parents could not support them, and, as trade concerns, technical schools can never be made to pay.

If their views be correct, it follows that the apprenticeship school is to be condemned, and that all technical teaching should be carefully relegated to its true sphere, that of methodising and systematising practice, of teaching the reasons for empirical rules, and showing how to reach new ones by skilful inference.

The object of technical school instruction should be not to make workmen, but to prepare men to become workmen, and thus understood, it will at once elevate the mind, and improve the wage-earning capacity of the artisan.

This truth is generally recognized in Germany and in England; but in France a contrary opinion prevails, and apprenticeship schools have been established there which cost the most fabulous sums to maintain, and which in no way return an equivalent for the money spent upon them. We, therefore, require a number of theoretical technical schools, well equipped, and adapted for boys and men of all ages from about 14 upwards. To these schools those will go who can afford to spend some years without earning their bread, and to those schools also will go the cleverer boys who are fortunate enough to win scholarships. But, in addition to this school-course, they will, if their parents are wise, also go thoroughly through the workshop. They may, as is done in Scotland, spend the summer at the workshop and the winter in the school, or they may take two or three years of one, and then spend some time at the other.

But

But for the mass of artisans, at least unless socialism is to come into force, this long course at day technical schools will be impossible. They have to earn their bread, even at 14; their parents cannot afford to support them, and, therefore, if elaborate day-schools are provided for them, the result is that these schools will gradually tend upwards, and become the property of the richer classes. It is no use providing for the artisan what he cannot make use of, and you cannot give scholarships for every boy in the whole nation.

This, then, brings us to the two things that we can do. We can at least prepare them in some degree in the elementary schools; we can provide them with evening classes during their apprenticeship years, and we can do all in our power to persuade masters and boys to take advantage of these advantages.

I propose to consider what method is the best to adopt in the elementary schools. What we want is to prepare an artisan for his work. Now, after arithmetic, the five sciences which are probably most useful to the artisan are geometry, algebra, mechanics, physics, and chemistry. For instance, the making of a clock brings in simple geometry, algebra, and mechanics; a steam-engine requires these and some knowledge of physics also; while a gas-engine demands an elementary acquaintance with all of them.

Now, as the first of these I have placed geometry. And I specially desire to include in this the art of looking at a thing, and then being able to remember how it was put together, to make a sketch of it, and to be able to show anyone how to make one like it; and the converse, of being able to see a picture of a thing, and then make the thing from the picture.

As an example of how much instruction is required in what appears so simple, I here exhibit five little clay models; they were done by five children (of from 9 to 11 years of age) selected at random, and quite without any previous training in form, and executed from the drawing that you see of a pyramid. You will notice that there is no idea in their minds of the sharp edges of the pyramid. They have made pear-shaped cones. This shows at once how much they need instruction.

Therefore it is here suggested that the elements of geometrical drawing should be taught in the elementary schools, using rulers and compasses, and closely in connection with a carpentry class. The course should not go far, but be thorough, and should include the principal properties of the straight line and circle. Repeated practice should be given in making drawings upside down, reversed, and of different dimensions. (It will be found that very many boys who can do a given problem in Euclid cannot do it if the figure is turned upside down.) The figures should be drawn out neatly with ruler and compasses; and elementary proof should be given, depending generally merely on symmetry and proportion. The strict logic of Euclid is best reserved till the faculties are more developed. Splendid as is the training, it is too severe for boys of 11 and 12, and rather retards than advances them in the subject.

Contemporaneously with the geometry class there should be a carpentry class; two lessons of two hours each a week is not at all too much to devote to this purpose. Short lectures should be given on the nature of woods and the use of tools, which should be introduced in proper order; first the saw, then the chisel, and then the plane. But all objects should be made to scale and measurement, and, if possible, little drawings of them made in a book, serving as practice in drawing and a record of progress. Then the jack and trying-planes should be introduced, and the boys taught the principles of making rectangular blocks of substances, the rules for which are of course the same for wood, stone or metal; the tests to show whether a surface is true or skew-shaped, &c., should be explained.

The boys may then go through a simple series of joints, such as are here shown, in drawing, and made up. But with all this it must be remembered that it is just as easy to do unprofitable hand-work as unprofitable head-work, and that technical education badly conducted may become more "mechanical" and stupefying than the worst conducted book lesson.

The above instructions will probably be sufficient for most boys up to the time they leave the Board-school.

The girls, and perhaps some boys, may be treated perhaps more on the artistic side. Instead of geometrical drawing and construction, they might be taught freehand drawing and modelling. I here exhibit a collection of work of a class of little girls at St. Jude's School, Whitechapel. It is not a good plan to place the work to be modelled on a flat table; it should be inclined at a steep angle like a desk, and the design to be copied placed sloping forward above it, so that the planes of both are about perpendicular to lines drawn from the eye to their respective centres. The good arrangement of light is also important. Stone, wood, or metal work depends on cutting a form out; modelling depends on building up. Hence the procedure in these arts is fundamentally different, a fact which should not be lost sight of.

We, lastly, come to the question of cost. The annexed list is arrayed for a class of thirty boys, there being supposed to be 300 in the school, of whom 150 had two lessons of carpentry each week. The set of drawing instruments here exhibited has been found to answer very well, and costs, complete, 3s.

The best form of bench, I think, is with an iron bench-screw. It is found in the French schools that the boys spoil wooden ones. Tools in carpentry may be divided into three classes—(1) necessary tools; (2) difficulty-saving tools; (3) labour-saving tools. An example of the second is, for instance, the "valet" and the mortising chisel. An example of the third is the mortising machine. It is obvious that the beginners should be furnished with the two first of these classes as much as possible, but not with the last. They should learn to sharpen their own tools.

To fit up a room with thirty benches and iron screws would cost about £30, and, therefore, adding £1 10s. a head for tools, we have £75 as the price of outfit for the school, including wood. The yearly salary of the teacher would be about the same as the salary of School Board masters. It is earnestly to be hoped that attempts will not be made to introduce turning or ironwork into the schools; it only distracts the attention of the boys, renders the class much more difficult to teach, and ends by spoiling the courses of instruction. It will be quite enough if the boys learn to make a few joints thoroughly, and to do their geometrical drawing fairly well. And so also wood-carving and fancy work should be forbidden during school hours.

For the modelling for 30 children, we need—5 cwt. of clay, 30 desks, 30 modelling tools, 30 boards for clay, a selection of copies. The cost of this will be about £12.

I have thus endeavoured to investigate the uses, objects, and cost of technical education in the Board schools, and it seems to me that these and other considerations, which will doubtless occur to the many gentlemen in the room of far more experience than myself in these matters, abundantly show that technical education in the Board schools may not only be made most beneficial to the children, but that this may be done at a cost that need in no way alarm the ratepayer, provided that the system is conducted with economy, and under due direction and limitation.

LIST of Tools required for an Elementary School for 30 Boys in a Class.

No.	Name.	Price each.	Totals.
		s. d.	£ s. d.
30	12-in. rules.....	0 1	0 2 6
30	Gauges .....	0 7	0 17 6
3	Compasses (5-in.) .....	0 9	0 2 3
3 doz.	Pencils .....	9d. per doz.	0 2 3
	Nails (various) .....	.....	0 4 6
	Screws „ .....	.....	0 2 0
30	Protractors.....	0 6	0 15 0
30	Awls .....	3/- per doz.	0 4 6
30	Gimlets .....	3/6 per doz.	0 5 3
6	Pincers .....	1 2	0 7 0
30	Iron wedges .....	1 0	1 10 0
30	Chisels (½-in.) .....	10/- per doz.	1 5 0
30	Chisels (¾-in.) .....	8/- per doz.	1 0 0
15	Socket mortising chisels (½-in.) .....	1 6	1 2 6
15	„ „ „ (¾-in.) .....	1 10	1 7 6
30	Gouges (3 sizes) .....	11/- per doz.	1 7 6
30	Jack planes (14-in.) .....	4 8	7 0 0
30	Tryng planes (20-in.) .....	5 6	8 5 0
1	Grindstone .....	.....	2 0 0
1	Axe .....	.....	0 2 6
6	Hones (with case) .....	4 0	1 4 0
2	Oil-cans .....	0 6	0 1 0
4	Quires sandpaper .....	0 6	0 2 0
1 lb.	Glue .....	.....	0 0 10
1	Gluepot and brush .....	.....	0 2 6
½	Standard of wood .....	.....	5 0 0
1	Broom and some brushes .....	.....	0 5 0
1	Spirit level .....	.....	0 2 6
6	Screw-drivers .....	1 6	0 9 0
6	Rasps .....	0 7	0 3 6
30	Hand-saws (22-in.) .....	5 0	7 10 0
30	Tenon-saws (10-in.) .....	5 0	7 10 0
30	Exeter hammers (No. 4) .....	1 6	2 0 0
30	Mallets (5-in.) .....	1 3	1 17 6
30	Squares .....	2 6	3 15 0
			£58 5 7

Less an average of 20 per cent. discount for cash gives £46 12s., or £1 10s. 9d. per head.

[21 plates.]

PLATE I.

*Division of Subjects of Instruction between the Department of Public Instruction and that of Commerce and Public Works, Bavaria, 1864. (New Arrangement of Studies.)*

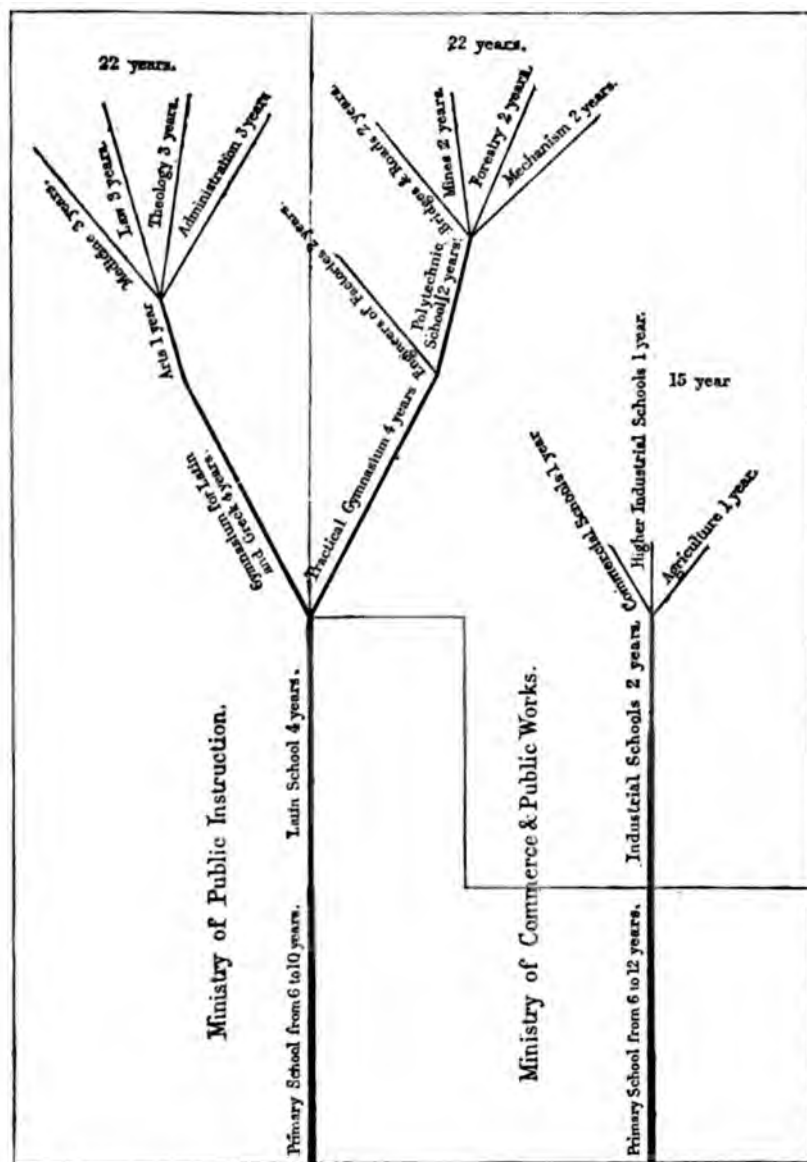


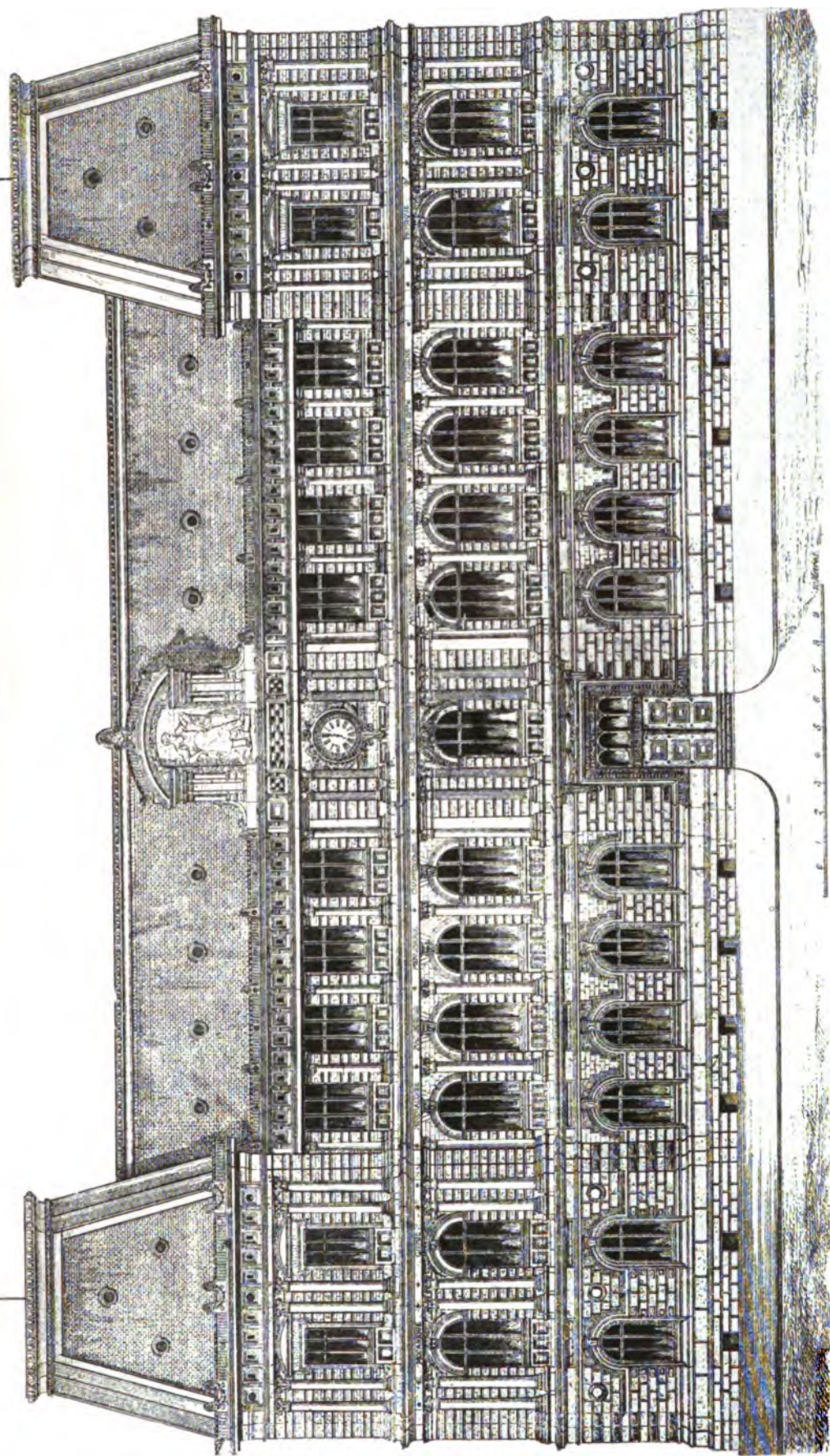




PLATE IV.

INDUSTRIAL SCHOOL BUILT BY THE MUNICIPALITY OF THE CITY OF LIEGE.

PRINCIPAL FACADE.



(sig 17-)



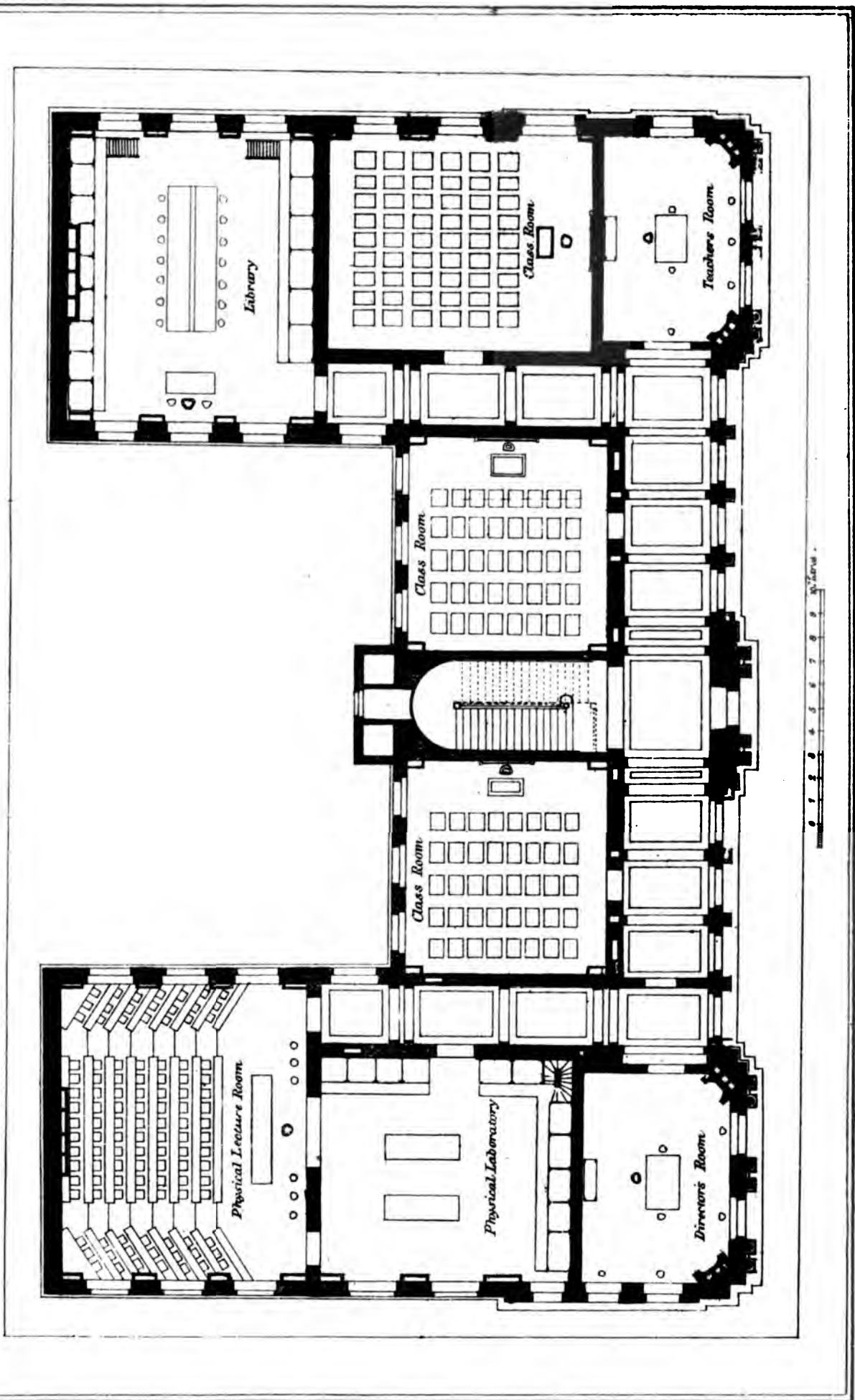






INDUSTRIAL SCHOOL, BUILT BY THE MUNICIPALITY OF THE CITY OF LIEGE.

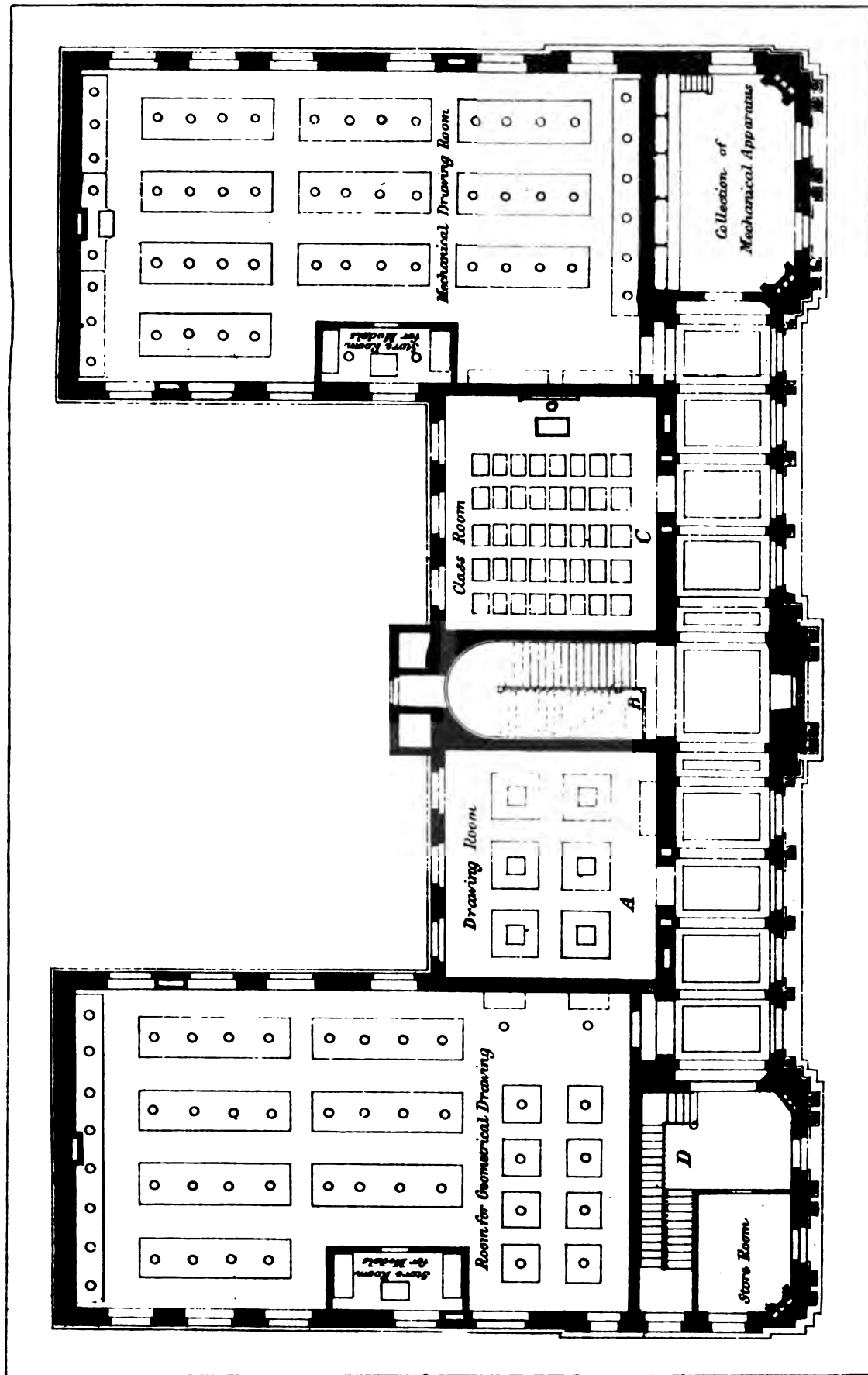
PLAN OF THE 1ST FLOOR.





# INDUSTRIAL SCHOOL, BUILT BY THE MUNICIPALITY OF THE CITY OF LIEGE.

## PLAN OF THE 2<sup>ND</sup> FLOOR.

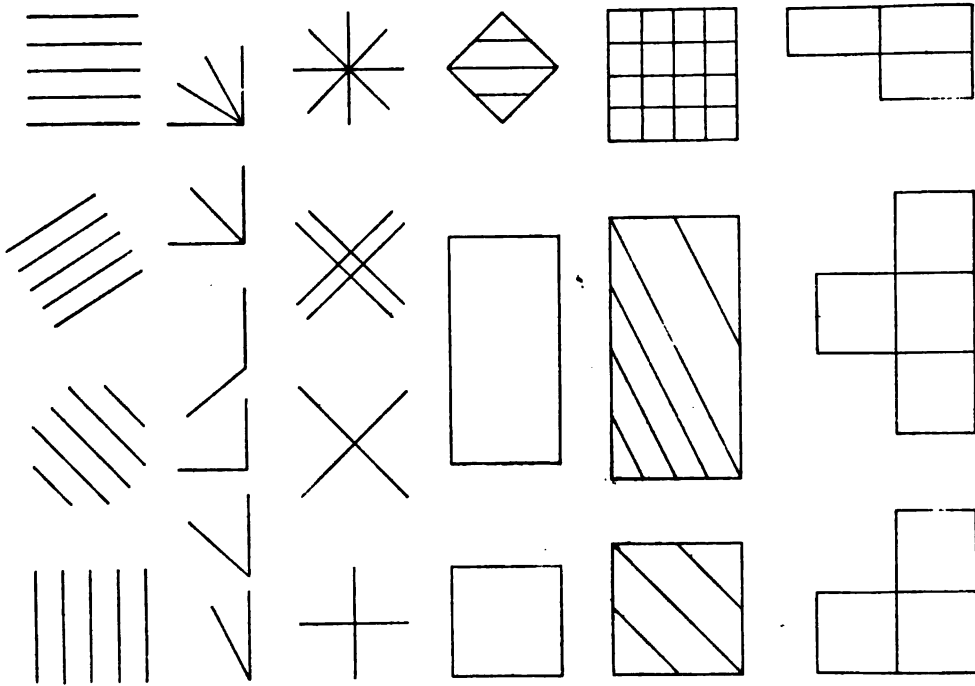


**NOTE.** The Staircase D gives access to the 3<sup>rd</sup> Floor which contains the rooms for Freshhand Drawing situated over the rooms marked A.B.C. with a total area of about 1935 sq feet



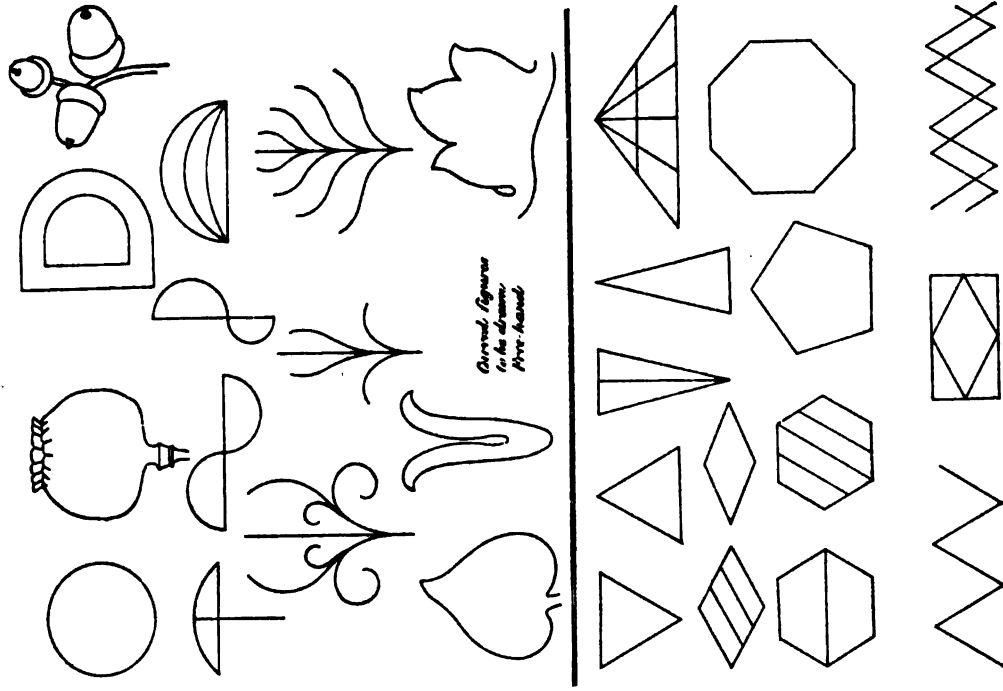
PLATE VIII.

A  
DRAWING IN ELEMENTARY SCHOOLS.  
STANDARDS 1 AND 2.



B

DRAWING IN ELEMENTARY SCHOOLS.  
STANDARD 3.



Curved figures  
to be drawn  
free-hand

C  
DRAWING IN ELEMENTARY SCHOOLS.  
STANDARD 4.

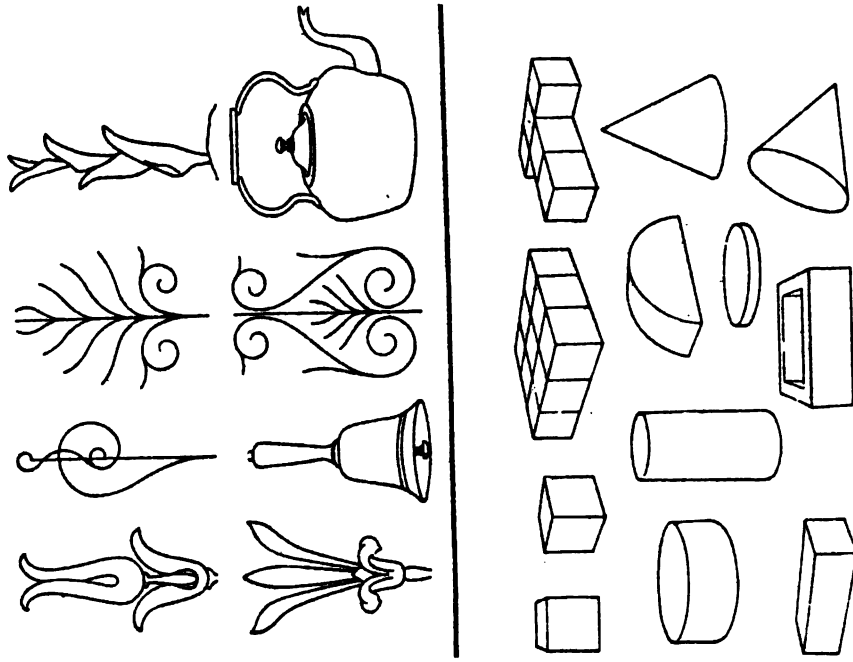
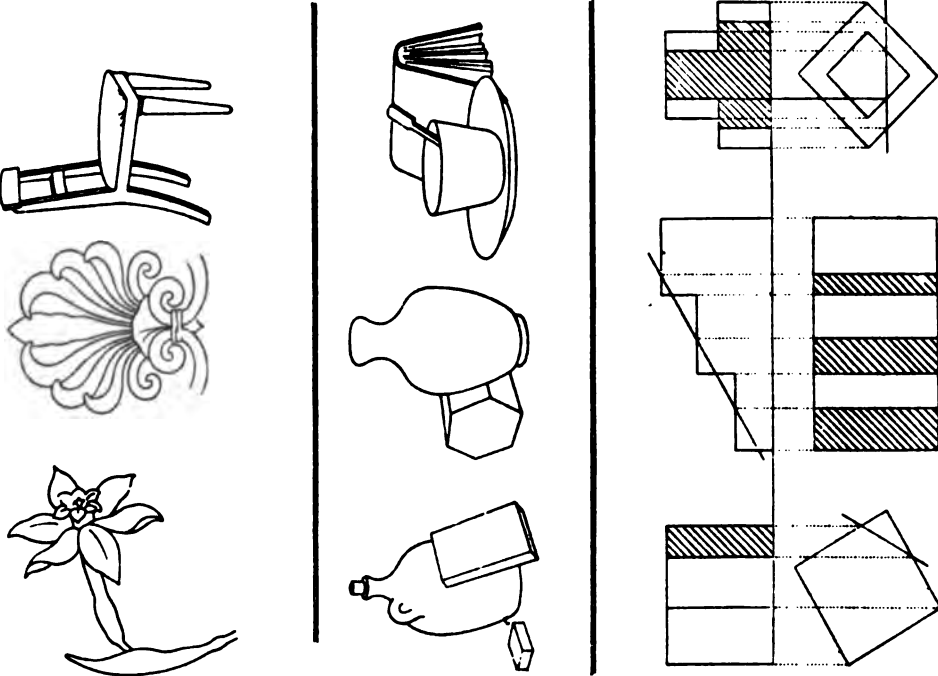




PLATE IX.

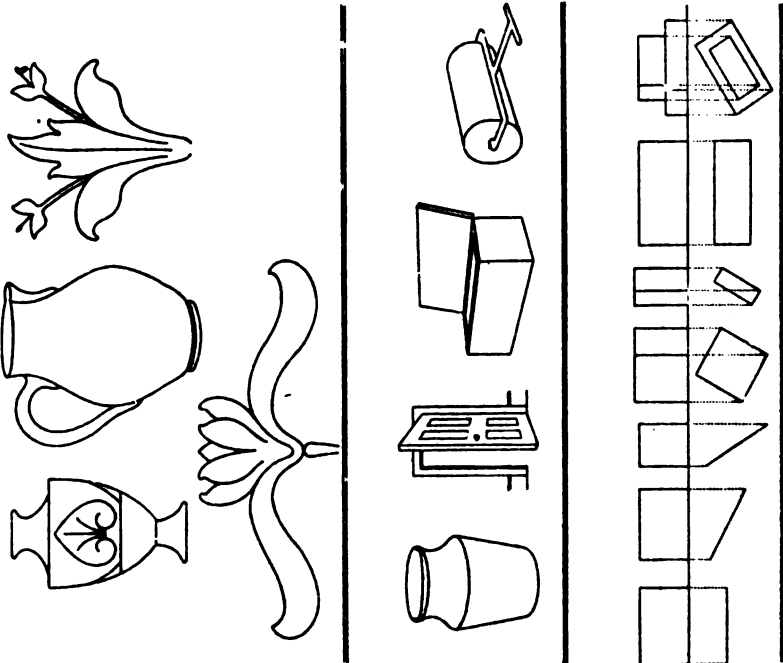
E

DRAWING IN ELEMENTARY SCHOOLS.  
STANDARD 6.



D

DRAWING IN ELEMENTARY SCHOOLS.  
STANDARD 5.



F

DRAWING IN ELEMENTARY SCHOOLS.  
STANDARD 7.

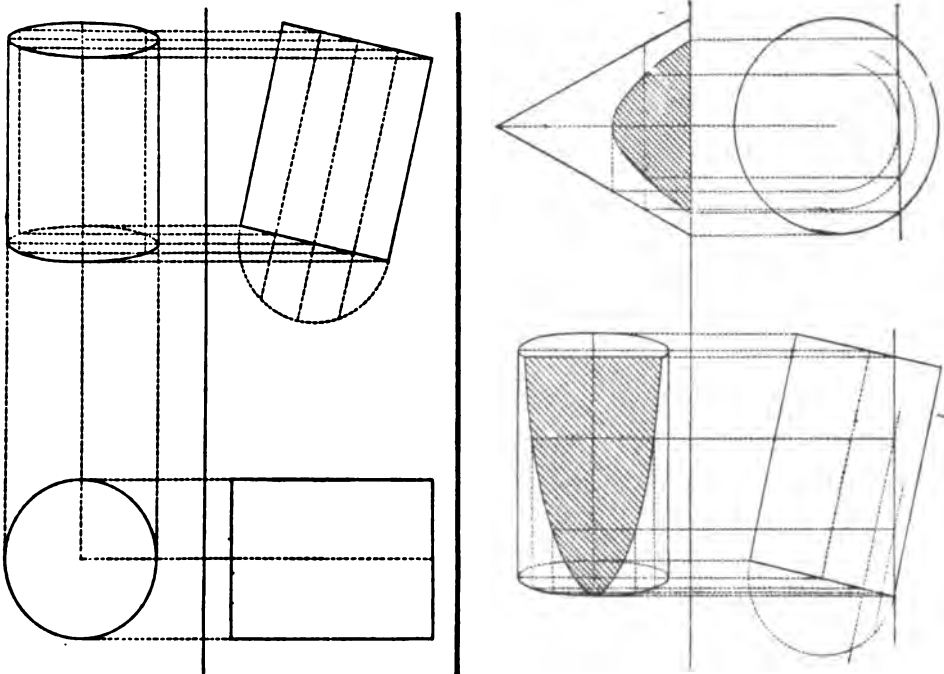


PHOTO-LITHOGRAPHED AT THE GOVT. PRINTING OFFICE,  
SYDNEY, NEW SOUTH WALES.





PLATE X.

G

DRAWING IN ELEMENTARY SCHOOLS.  
STANDARD 7



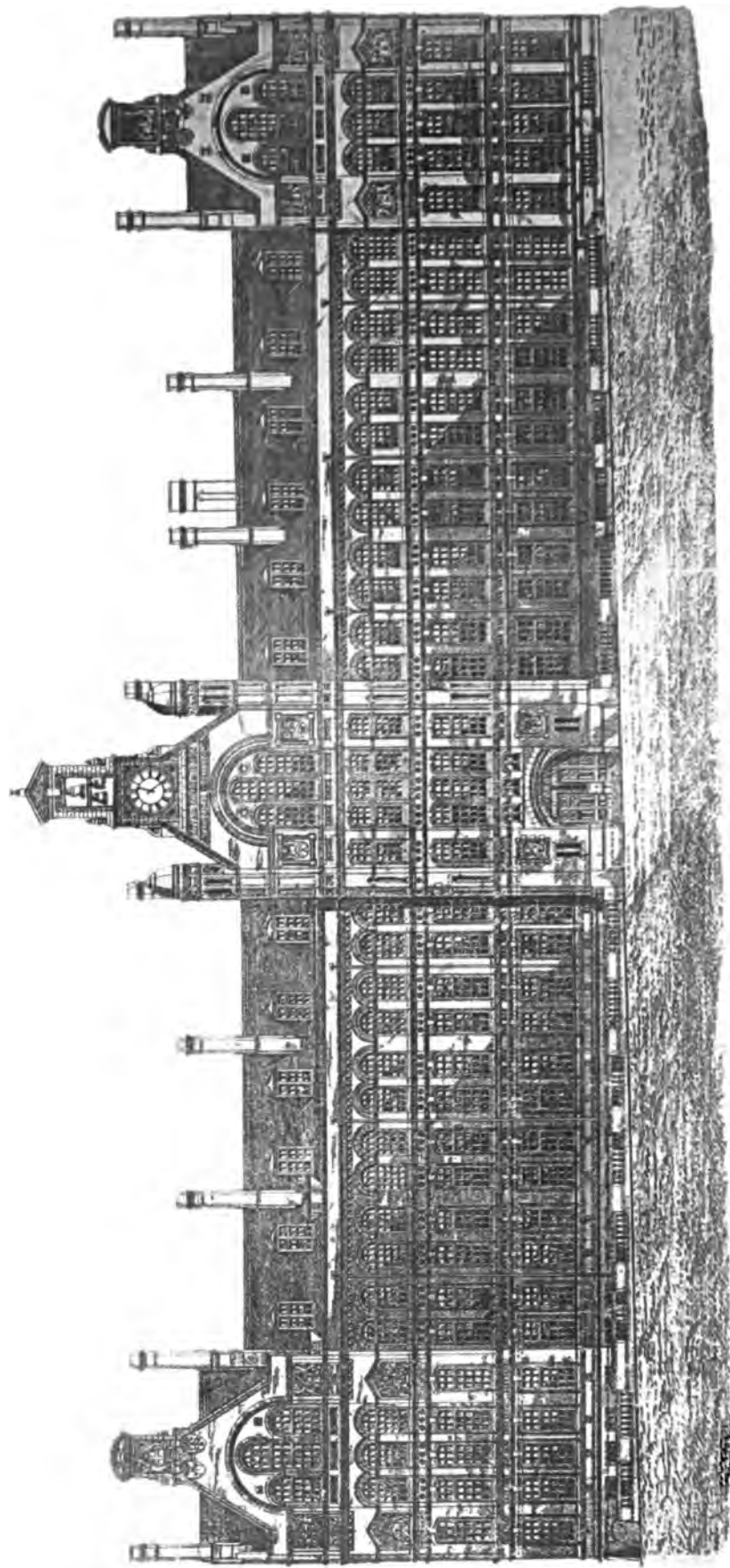
(fig 17)



PLATE XI.

THE CITY AND GUILDS OF LONDON TECHNICAL INSTITUTION

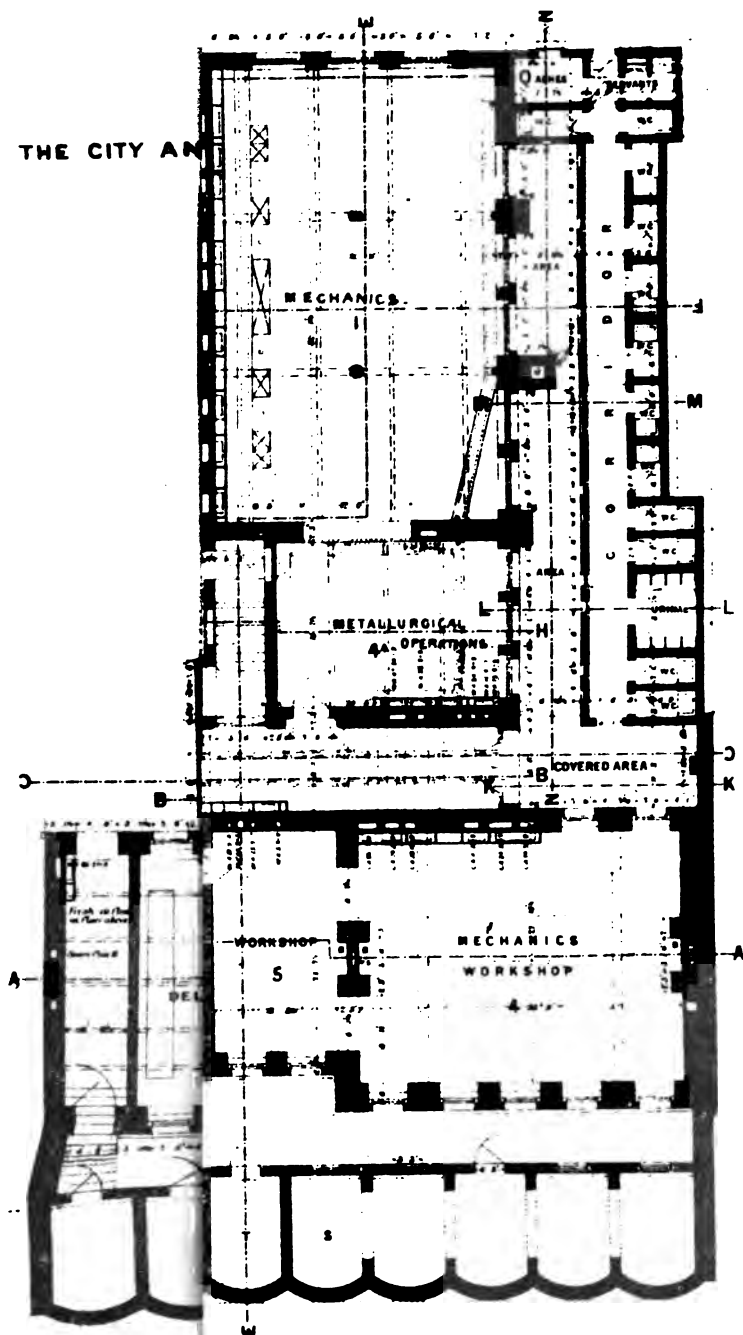
FRONT ELEVATION



(Sig. n.)



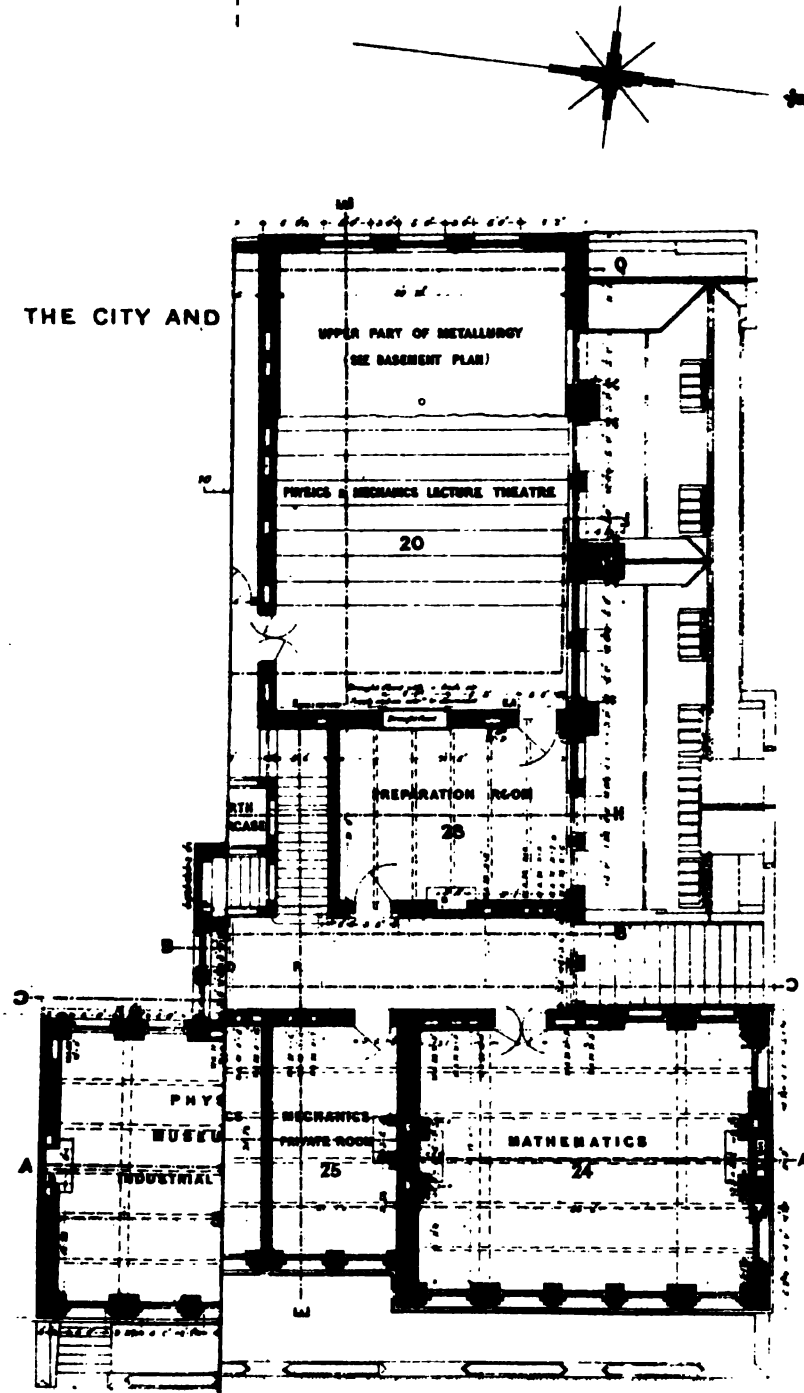
THE CITY AND



(S)



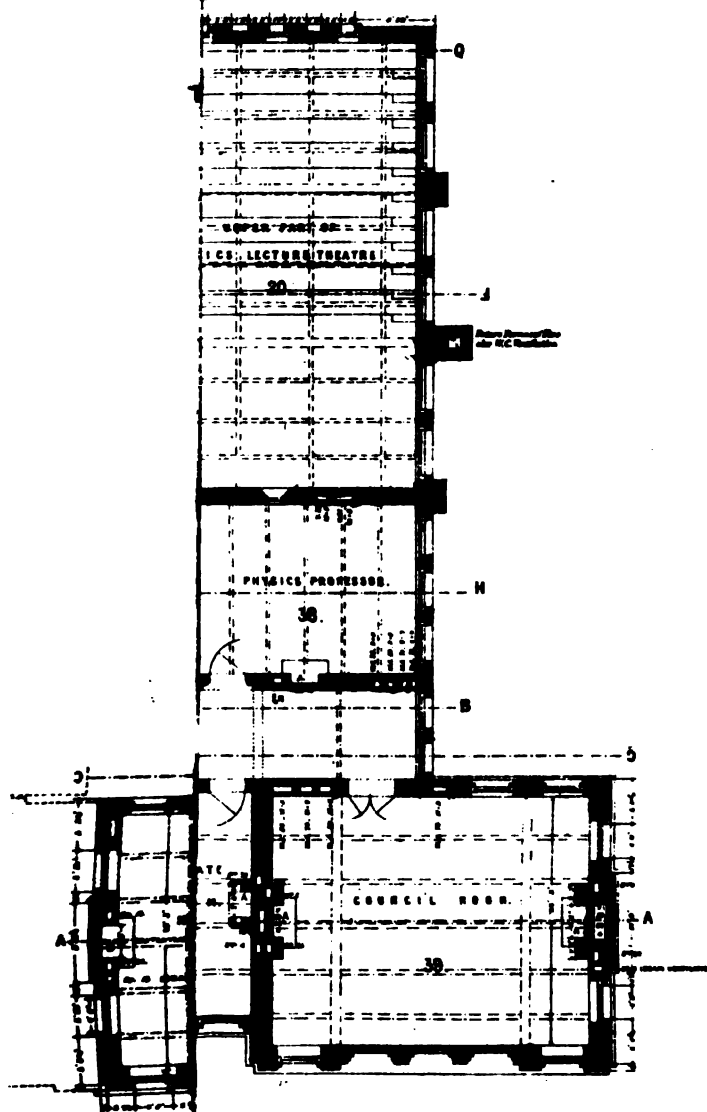
THE CITY AND



(Sig)













THE CITY

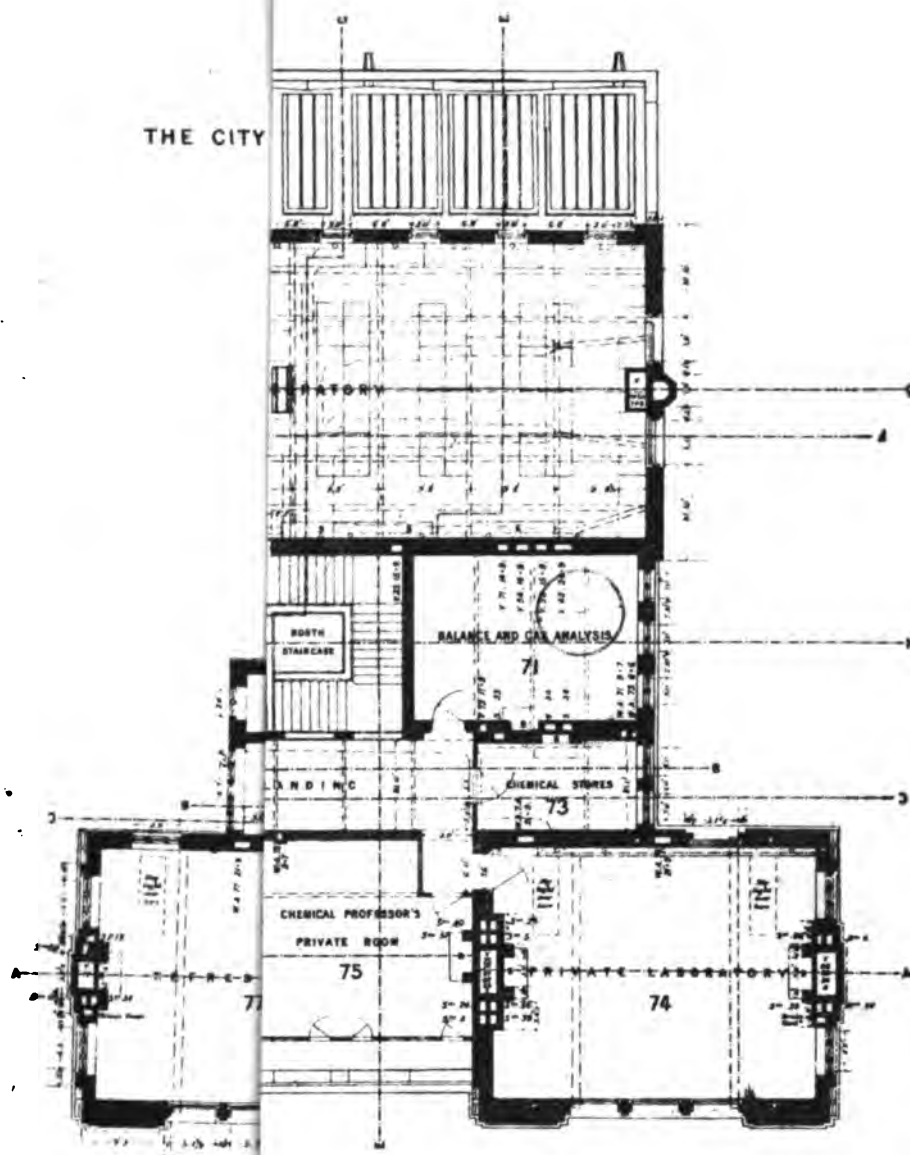




PLATE XVII.

# BERLIN. KUNSTGEWERBE SCHULE & MUSEUM.

## GROUND PLAN

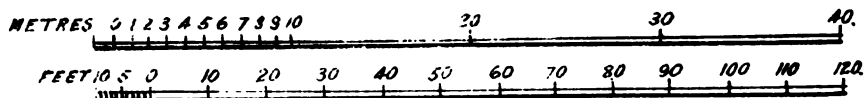
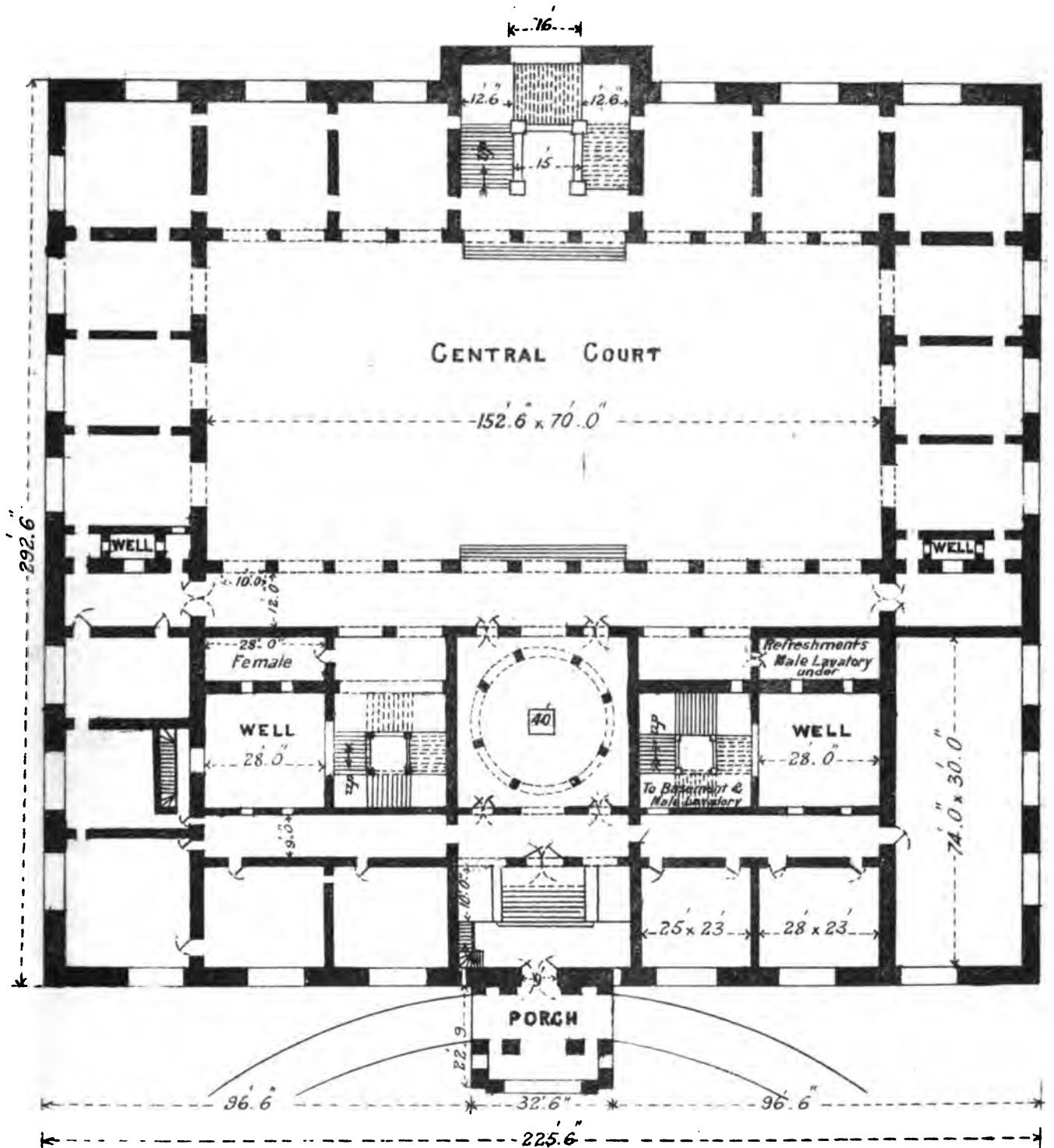


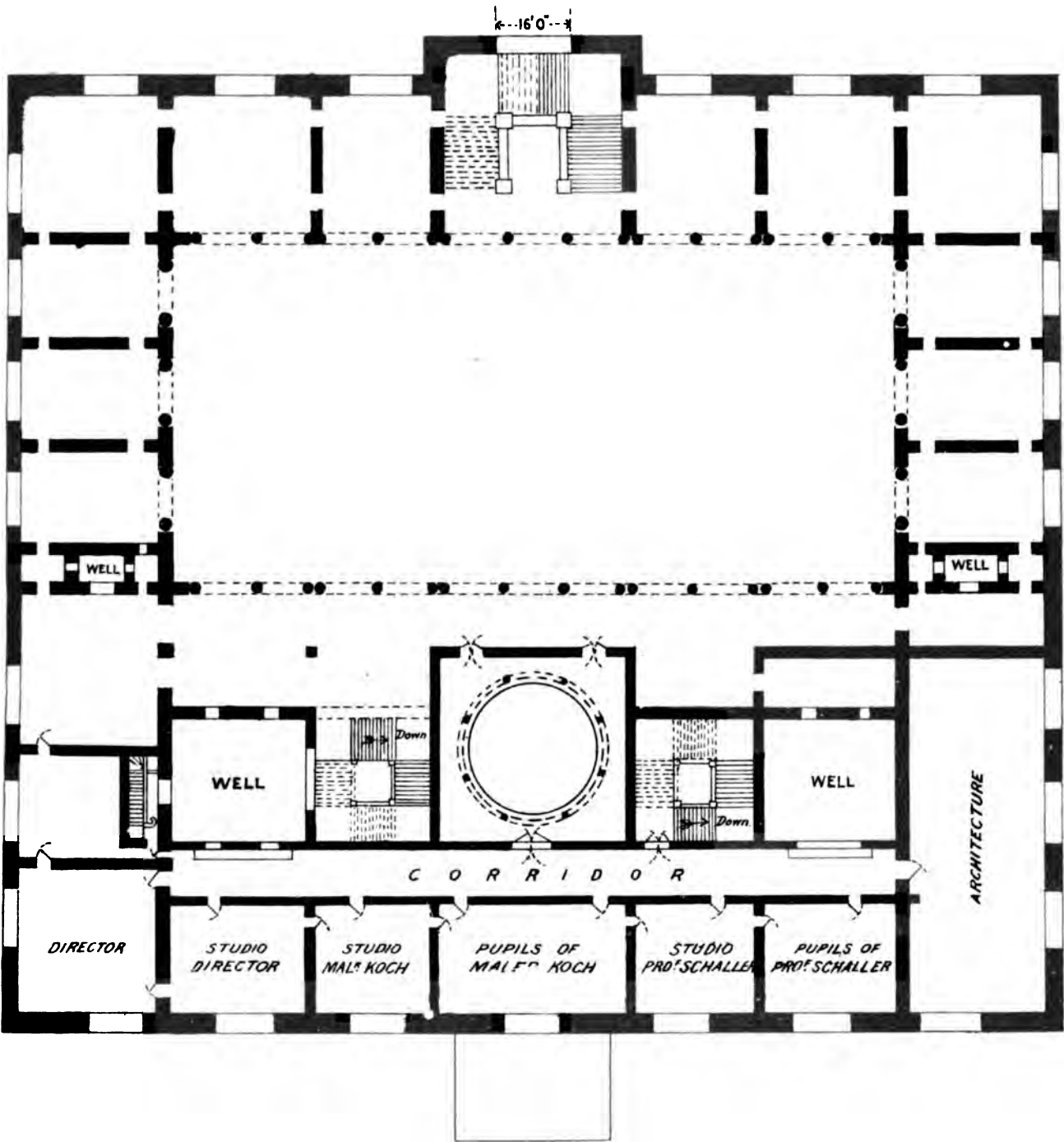
PHOTO-LITHOGRAPHED AT THE GOVT. PRINTING OFFICE,  
SYDNEY, NEW SOUTH WALES.





PLATE XVIII

FIRST FLOOR PLAN



(Sig 17-)

PHOTO-LITHOGRAPHED AT THE GOVT. PRINTING OFFICE,  
SYDNEY, NEW SOUTH WALES.



PLATE XIX

SCHOOL PLAN

NOTE — *Modelling & Caretakers Rooms are in the Basement besides specially arranged Rooms belonging to the Museum*

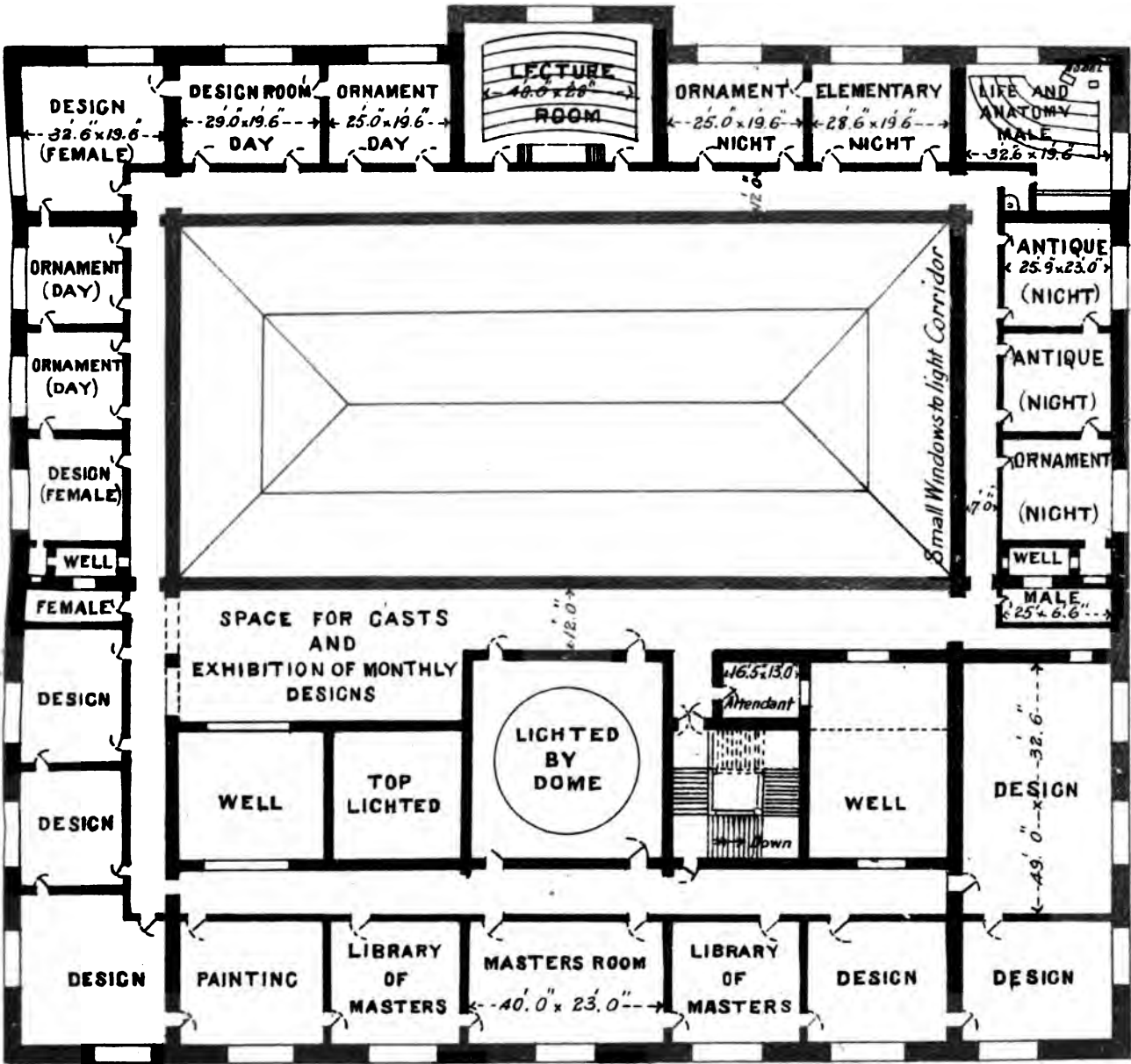


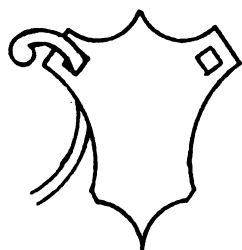
PHOTO-LITHOGRAPHED AT THE GOVT. PRINTING OFFICE, SYDNEY, NEW SOUTH WALES.

(Sig. 17.)



PLATE XX.

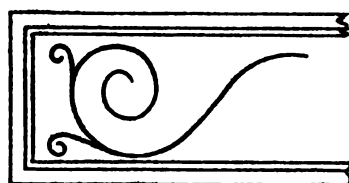
*A.*



*A\*.*



*B*



*B\**

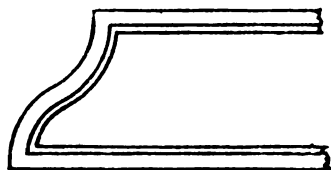




Fig 1.

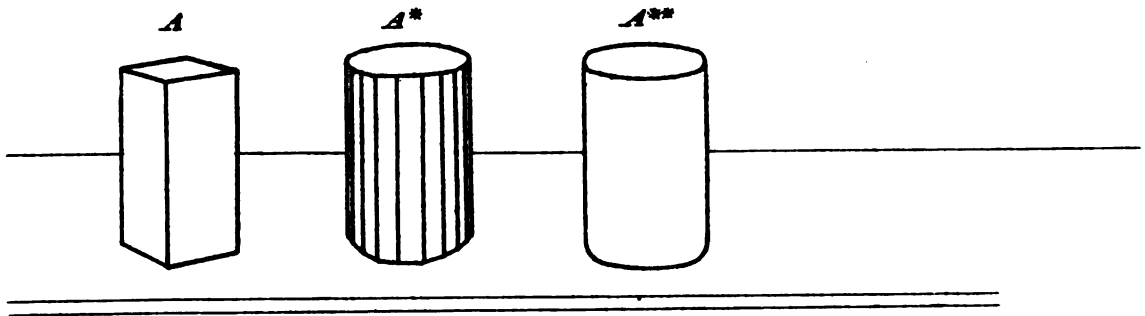


Fig 2.

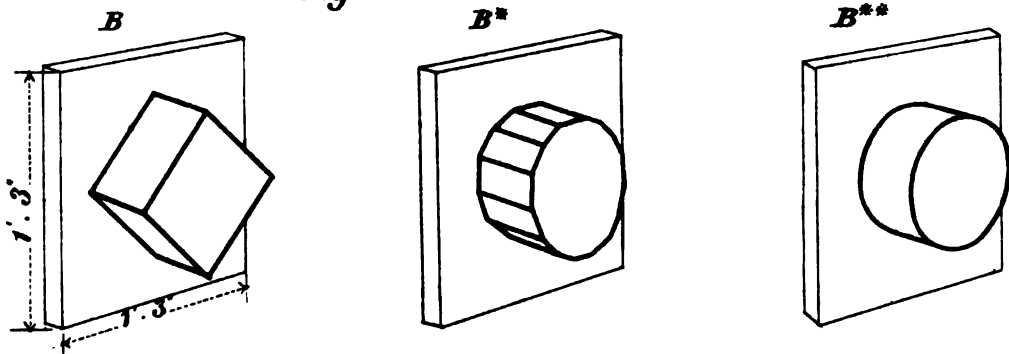


Fig 3.

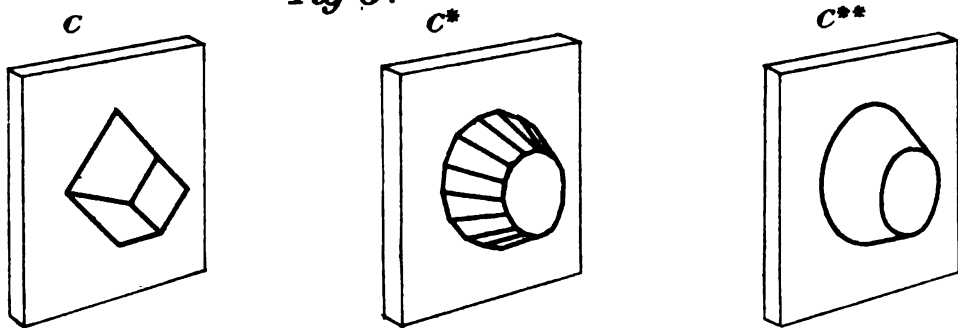


Fig 4.

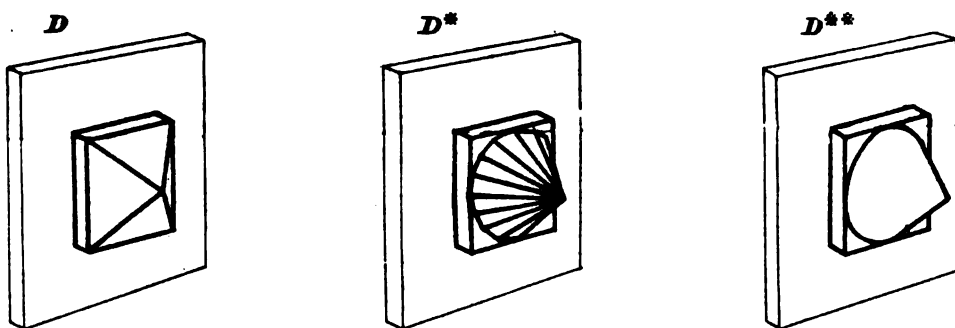
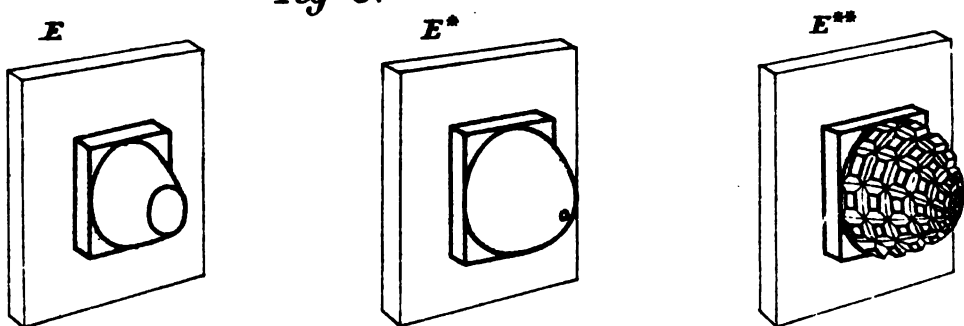


Fig 5.



(Fig 17)

















